(No Model.) 2 Sheets—Sheet 1.

J. J. VINTON.

PROCESS OF PRODUCING STEEL CASTINGS FROM OLD STEEL RAILS.

No. 343,617. Patented June 15, 1886.

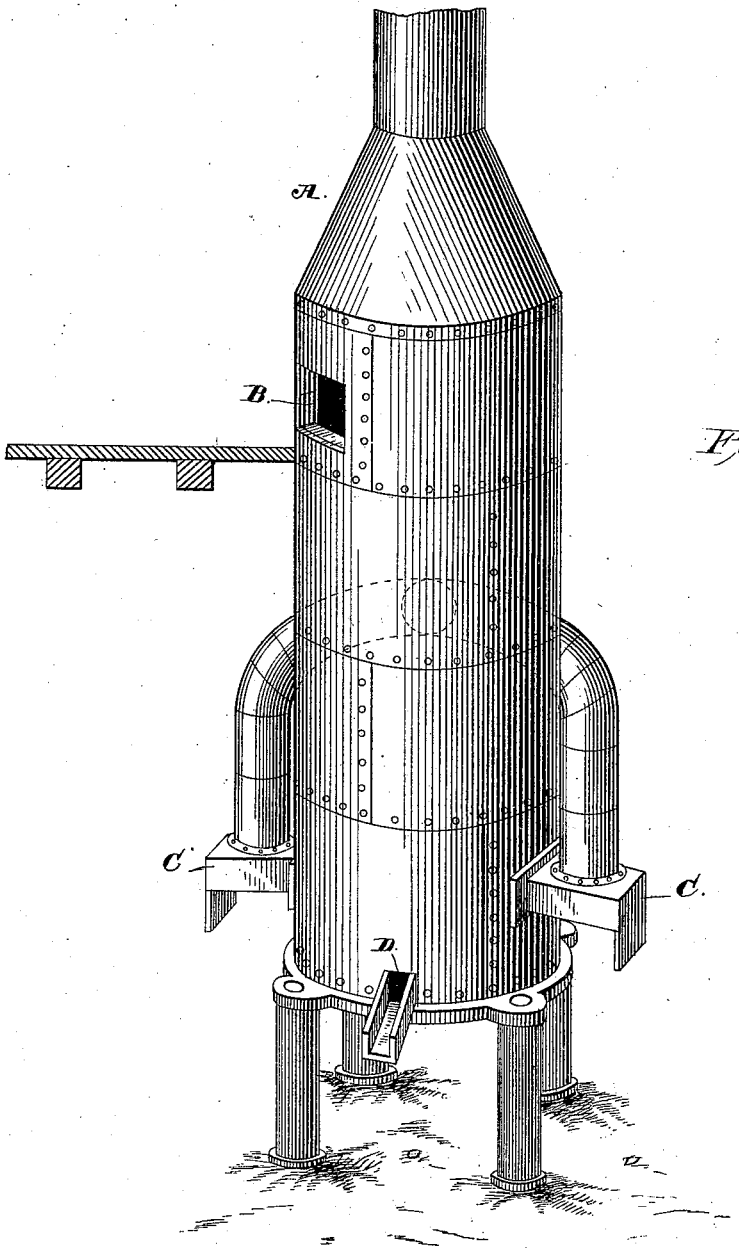

Fig. 1.

WITNESSES
M. E. Fowler
Edward G. Siggers

INVENTOR
John J. Vinton
By C. A. Snow & Co.
His Attorneys

(No Model.) 2 Sheets—Sheet 2.

J. J. VINTON.

PROCESS OF PRODUCING STEEL CASTINGS FROM OLD STEEL RAILS.

No. 343,617. Patented June 15, 1886.

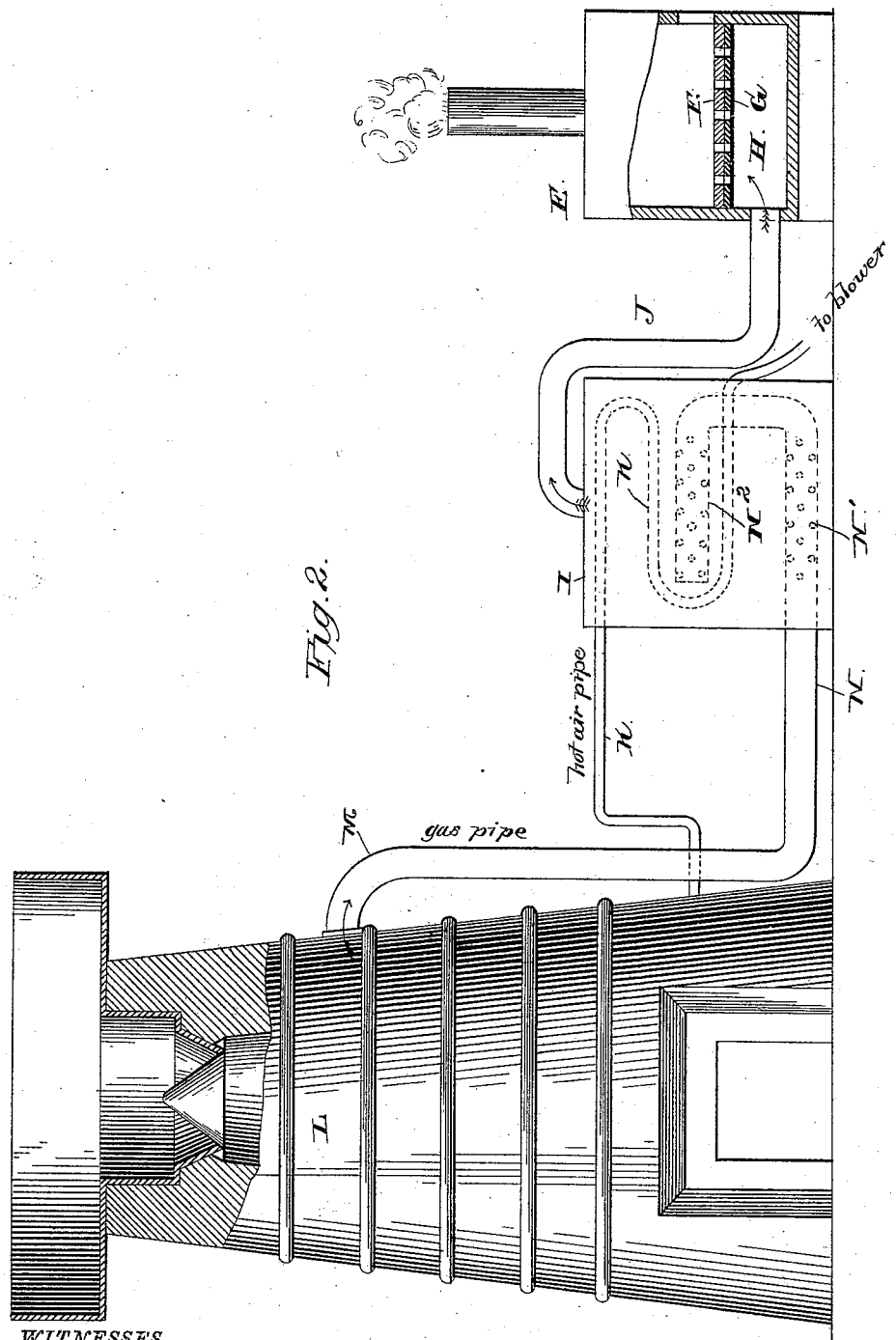

Fig. 2.

WITNESSES

M. E. Fowler

E. G. Siggers

INVENTOR

John J. Vinton

By C. A. Snow & Co

his Attorneys

UNITED STATES PATENT OFFICE.

JOHN J. VINTON, OF YOUNGSTOWN, OHIO.

PROCESS OF PRODUCING STEEL CASTINGS FROM OLD STEEL RAILS.

SPECIFICATION forming part of Letters Patent No. 343,617, dated June 15, 1886.

Application filed July 24, 1885. Serial No. 172,590. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. VINTON, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented a new and useful Improvement in Processes of Producing Steel Castings from Old Steel Rails, of which the following is a specification, reference being had to the accompanying drawings.

This invention has relation to a new process of producing malleable-steel castings, edge-tools, &c., from old steel rails.

It has long been desired to make some use of old steel rails which have been used until they become worthless. What to do with them has been the question which railroad companies and manufacturers have asked themselves. The peculiar process by which these articles are made has heretofore precluded them from being reworked. It is owing to this fact that old and imperfect rails are allowed to go to waste, no plan having yet been devised by which to rework them advantageously and profitably. It has been proposed to convert these old rails, by a process of subjecting them to the action of a cupola-furnace, a refining-furnace, and a puddling-furnace, into new rails; but this was open to objection, inasmuch as the method of performing this was too expensive, and, besides, the rails were not sufficiently good in quality to make it desirable to take such steps.

The object of my invention is to solve this problem, and this I do by melting these old rails in a cupola-furnace and converting them into malleable castings—such as horseshoes, wrenches, &c.—and edge-tools—as hatchets, hoes, chisels, &c. — this being performed by a simple process, hereinafter described, whereby I am enabled to place on the market a superior article of manufacture at a greatly-reduced cost, making it profitable both to the manufacturer and purchaser.

With this end in view the invention consists in melting these steel rails in a cupola-furnace, the molten metal being drawn off into ladles and molded or cast in molds to suit the articles which are being manufactured, and then subjecting these molded articles within suitable annealing-ovens to the action of the gases usually employed in annealing iron, or the gases from a blast or other furnace, thereby utilizing these gases, which are usually wasted, to free the carbon from the molded articles, the latter being left in a malleable state, all as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a cupola-furnace in which the old steel rails are reduced. Fig. 2 is a front elevation of a blast-furnace, showing the connection between it and the hot-blast oven and annealing-oven.

Like letters are used to indicate corresponding parts in both the figures.

Referring to Fig. 1 of the drawings, A designates the ordinary form of cupola-furnace, open at the top for the escape of the flame and gases, and provided with an opening, B, in one side for the admission of the charge. The tuyeres C are connected by pipes with a suitable blower, (not shown,) and supply the furnace with a blast of air, which passes through the charge to assist combustion. A tapping-hole, D, is located at the bottom of the furnace, and is closed during melting by a ramming of sand. When it is desired to draw off the molten metal, this hole is tapped in the usual manner, to allow the metal to run out into suitable ladles held there to catch it.

To charge the furnace, coke, charcoal, or anthracite coal is admitted through the opening B until the quantity of the fuel stands about eighteen inches within the furnace above the point where the tuyeres C are connected. The steel rails having previously been broken or cut into lengths sufficiently small to enter the furnace, a quantity of these pieces or lengths of old rails is admitted through the opening B upon the fuel. Another supply of coke or coal is placed upon the charge of old rails, and over this coke I place an additional quantity of old rails, and so on, proceeding in this manner until the furnace is full, or nearly so. As the charge begins to melt, the metal, being the heaviest, falls to the bottom of the furnace, ready to be drawn off through the tapping-hole D. Part of the carbon contained in the coke is taken up by the molten metal, so that when this molten metal issues from the tapping-hole it contains an excess of carbon, which should be withdrawn to make it malleable. The metal is caught in ladles, and from thence poured into sand molds to produce the articles which are desired to be manufactured. These

molds may be shaped to make castings for wrenches, horseshoes, and edge-tools—such as hatchets, hoes, chisels, &c.—and, in fact, any article which has heretofore been made of cast steel or iron. I therefore do not wish to be limited to the use which I may make of my invention in this respect. After the articles are withdrawn from the molds they are packed in boxes or pots and placed within the annealing-oven E. (Shown in Fig. 2.) The latter has a perforated bottom, F, of brick-work, and a perforated metallic plate, G, beneath the bottom, the perforations of the plate and bottom registering with each other to allow the upward passage of the gases, as hereinafter described.

Beneath the plate G is a chamber, H, which is supplied with gases from the hot-blast oven I by a pipe, J, the latter connecting with the top of the oven, and carrying off the gases therefrom which are usually wasted. The blast-oven I has a coiled pipe, K, within the same, one end of which pipe extends through the side of the oven at the bottom, and is connected with a rotary fan or other suitable blower, and the other end of the pipe K extends through the side of the oven at the top and connects with the blast-furnace L, which is of the usual construction, as shown.

A pipe, M, connects with the top of the blast-furnace to carry off the gases and products of combustion therefrom. This pipe M connects by a suitable pipe or flue with a perforated pipe, N, which extends across the bottom of the blast-oven I, the perforated pipe having branches N' N^2, arranged above each other within the oven, and having a continuous communication. As the gas escapes from the perforated pipes N N' N^2, it fills the oven, and is ignited by any suitable means, the perforations of the pipes forming burners, as it were, causing the heating of the coiled pipe K. As the latter is supplied with a blast of air from a blower, the air, as it passes through the coil of pipe within the oven I, is heated, and this heated air in the form of a blast is forced into the blast-furnace L, for the purpose well known. I thus employ the gases of the furnace to heat the air supplied thereto, and also utilize these gases, which are usually wasted after they pass through the hot-blast oven, to anneal the molded articles within the annealing oven.

When it is desired to reduce the amount of carbon in the molded articles, they are packed in scale in the pots or boxes, which are placed in the annealing-oven E. When the molded articles are packed in charcoal, the subsequent annealing process causes the amount of carbon in the castings to be increased, thereby closing the pores of the fibrous steel sufficient to enable them to be tempered, as in the case of edge-tools.

In my process I melt old steel rails for the express purpose of making malleable castings and all edge-tools.

In case it will be found inconvenient to obtain gases from a blast-furnace, I propose to utilize natural gas or coal-gas.

I have shown, for the sake of illustration only, a cupola and blast furnace as employed in my process; but I wish it understood that other means may be employed to effect the same end, as may be found convenient and desirable to the manufacturer.

I am aware that it is old to melt steel-scrap in a cupola-furnace with coke, for the purpose of subsequently converting the same into steel castings; but it should be understood that castings made from old steel rails are superior to steel castings made by the old way of casting steel-scrap, using black oxide of manganese in the smelting of the scrap-steel.

I am aware that it is not new to submit wrought-iron to the action of blast-furnace or other gases under compression in a gas-tight vessel or receiver for the purpose of case-hardening the iron. In my improvement I first carbonize the old steel rails when melting or reducing the same in the cupola-furnace, and subsequently decarbonize the castings by the action of the blast-furnace gases, and this has never been done before, to the best of my knowledge and belief, in treating old steel rails, or indeed steel scraps. By this process I am enabled to produce a casting of superior grade and quality. Furthermore, in my process the blast-furnace gases are used to anneal the castings, and not to case-harden them, as formerly. The gas is admitted within the annealing-oven and circulates freely therein around the boxes in which the castings are placed. The oven is not gas-tight; neither is the gas admitted under pressure, as in the old process referred to; but the gas is allowed to escape from the oven after having acted upon the steel castings therein, its place being supplied by gas entering the oven.

By my process I am enabled to place on the market an article of manufacture of the class mentioned which will be superior in point of cheapness, durability, and beauty of finish to those now before the public.

Having described my invention, I claim—

The herein-described process of producing steel castings from old steel rails, consisting in melting the rails in a cupola-furnace and causing the molten metal to be carbonized, casting the metal into such forms and articles desired, then placing these molded articles in suitable annealing-ovens, and finally admitting gases from a blast-furnace, after the gases escape from the blast-oven, to the interior of the annealing-oven, and causing the gas to circulate freely therein and escape after having acted upon the castings to decarbonize the same, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOHN J. VINTON.

Witnesses:

EDW. G. SIGGERS,

JOHN H. SIGGERS.