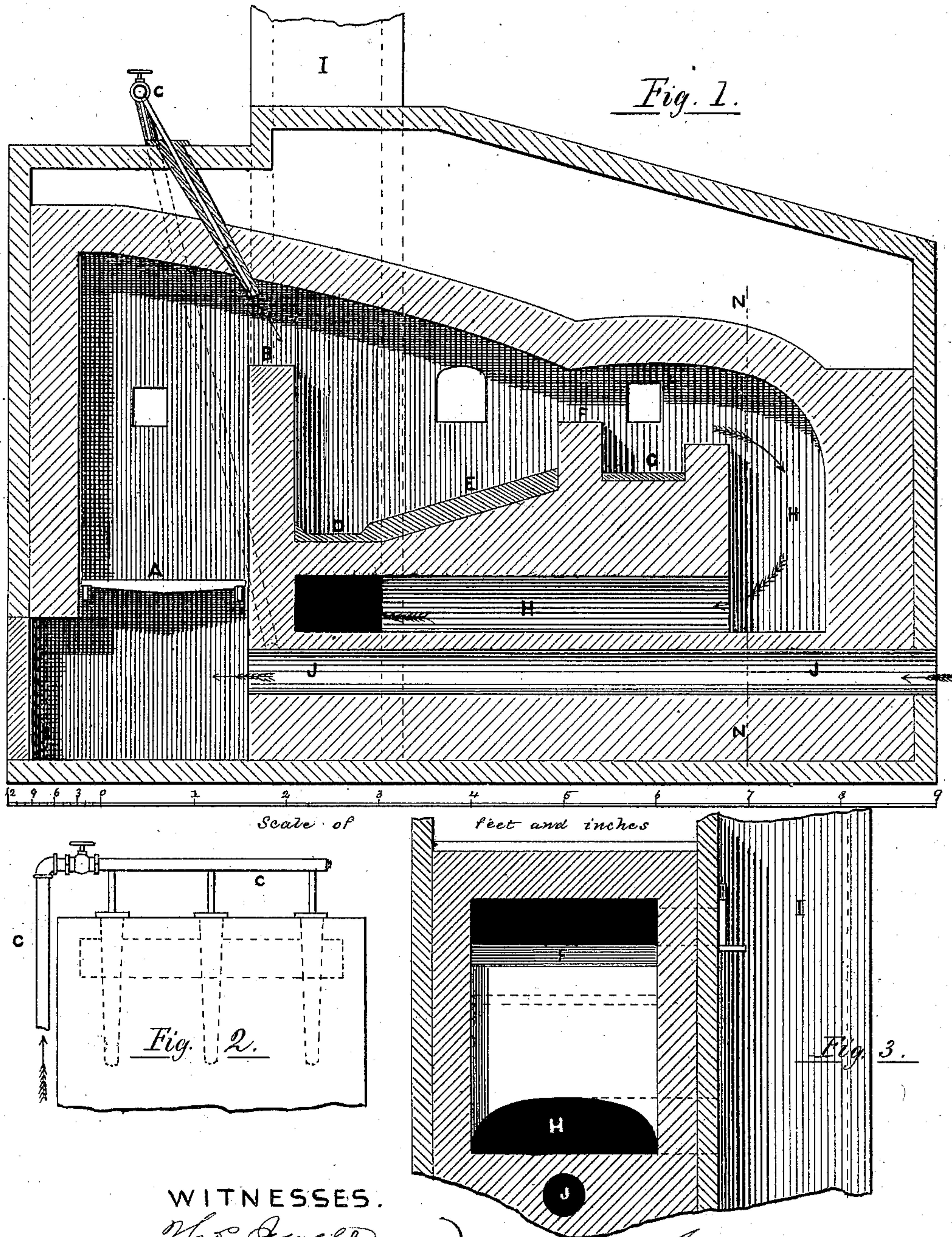


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Improvement in Process and Apparatus for the  
Manufacture of Steel and Treating Metals.

No. 130,637.

Patented Aug. 20, 1872.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

IRA HERSEY, OF FORT EDWARD, NEW YORK.

## IMPROVEMENT IN PROCESSES AND APPARATUS FOR THE MANUFACTURE OF STEEL, AND TREATING METALS.

Specification forming part of Letters Patent No. 130,637, dated August 20, 1872.

### *To whom it may concern:*

Be it known that I, IRA HERSEY, of the town of Fort Edward, county of Washington, State of New York, have invented a new and useful Improvement in Reverberatory Furnaces for Manufacturing Steel and Refining Metals, of which the following is a specification:

### *Object and Advantages.*

My invention relates to the peculiar form and construction of a furnace wherein iron, copper, silver, and lead can be melted and run off into a basin so placed and surrounded with heat that the metal can be kept from cooling until such quantity can be accumulated before tapping as may be required for any size ingot or form of casting; also, the transfer of "balls" of iron under white heat or near the same, from a puddling-furnace or a blomary, direct to the hearth-floor of this furnace, to be treated as hereinafter explained.

The drawing shows the form and peculiarity of my invention.

Figure 1 represents a longitudinal section of the furnace.

A represents the fire-grate. B represents the fire-bridge. C represents a steam-jet. D represents the metal-basin. E represents a descending hearth-floor, of sufficient elevation to allow the metal to flow freely into the basin D. F represents a flue-bridge. G represents a stove or oven for heating metal with the waste heat, preparatory to the transfer of same to the hearth-floor E. H represents the arch fire-flue, constructed under the hearth and metal-basin, and connecting with the stack I. J represents a blast air-flue, passing under the fire-flue and into the chamber under the fire-grate bars.

Fig. 2 represents an end view of the furnace, showing the steam-jets C. Fig. 3 represents a cross-section of the furnace taken at line *z z*, showing fire-arch H, air-flue J, and bridge-flue F.

### *Explanations.*

The in-walls of the furnace, also the fire-flues, are constructed of the best kind of fire-brick. The hearth-floor should be covered, in

thickness of about four inches, with a mixture of plumbago, fire-clay, and sand, or with old crucibles and coke, well pulverized and mixed, or a portion of each will make a good lining, and which can be easily replaced. The metal-basin should be lined with the same material. The oven-floor should be formed with a sand bottom in same manner as used in the steel-heating furnaces. The object of removing the "balls" of unhammered iron from a puddling-furnace or blomary fire direct to this furnace is twofold—a great saving of heat and labor, and the more easy and quick conversion into steel or semi-steel by recarbonizing with chemicals, pig-iron, or spiegeleisen, or with a portion of each. The chemicals, composed of manganese, prussiate potash, charcoal, and salt, and sometimes sal-ammoniac, or their equivalents, should be finely pulverized and mixed together, and put in cans of one pound each, made of thin sheet-iron or zinc. The same should be placed in the furnace under the metal as soon as the same is brought to a white heat, and in such quantity as may be required to carburize for either high or low steel. Chromé ore, also a silicious ore known as Codorus, can be used in this mode of refining and conversion to great advantage.

The peculiar form of this furnace, in combination with the steam-jet, as patented by me May 7, 1872, No. 126,546, places this process of refining and carburizing iron, or reducing and refining copper and other metals, wholly under the control and intelligence of the operator. Any degree of heat required can be quickly obtained, applied, and shut off, as may at any time be necessary. The metal as fast as melted flows into the basin, combined with scoria, which immediately separates and rises to the top, and serves to prevent the metal from oxidizing. Both can be tapped off on either side of the furnace, and in such quantity as may be found most expedient.

I claim, therefore—

1. The improvement of an inclined hearth-floor connecting with a receiving-basin, for any kind of melted metal, as described.

2. The improvement of transferring iron in "ball" form, while hot, from a furnace or from

a blomary fire direct to a hearth-floor, where the same can be carburized, melted, and run into ingots or other forms of steel castings.

3. The introduction or adding of chemicals, substantially such as herein described, inclosed in sheet-metal cans, for the purpose of fluxing and recarbonizing, as described.

4. The whole, in combination—the hearth-

floor and basin, the steam-jets, heating-oven, fire-flue, air-flue, and the mode of introducing carbon and flux—as described, as a process.

IRA HERSEY.

Witnesses:

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SAM. T. PREUHID.