

F. W. HAWKINS & G. F. KEY.

IRON REFINING FURNACE.

APPLICATION FILED MAY 21, 1906.

949,475.

Patented Feb. 15, 1910.

3 SHEETS—SHEET 1.

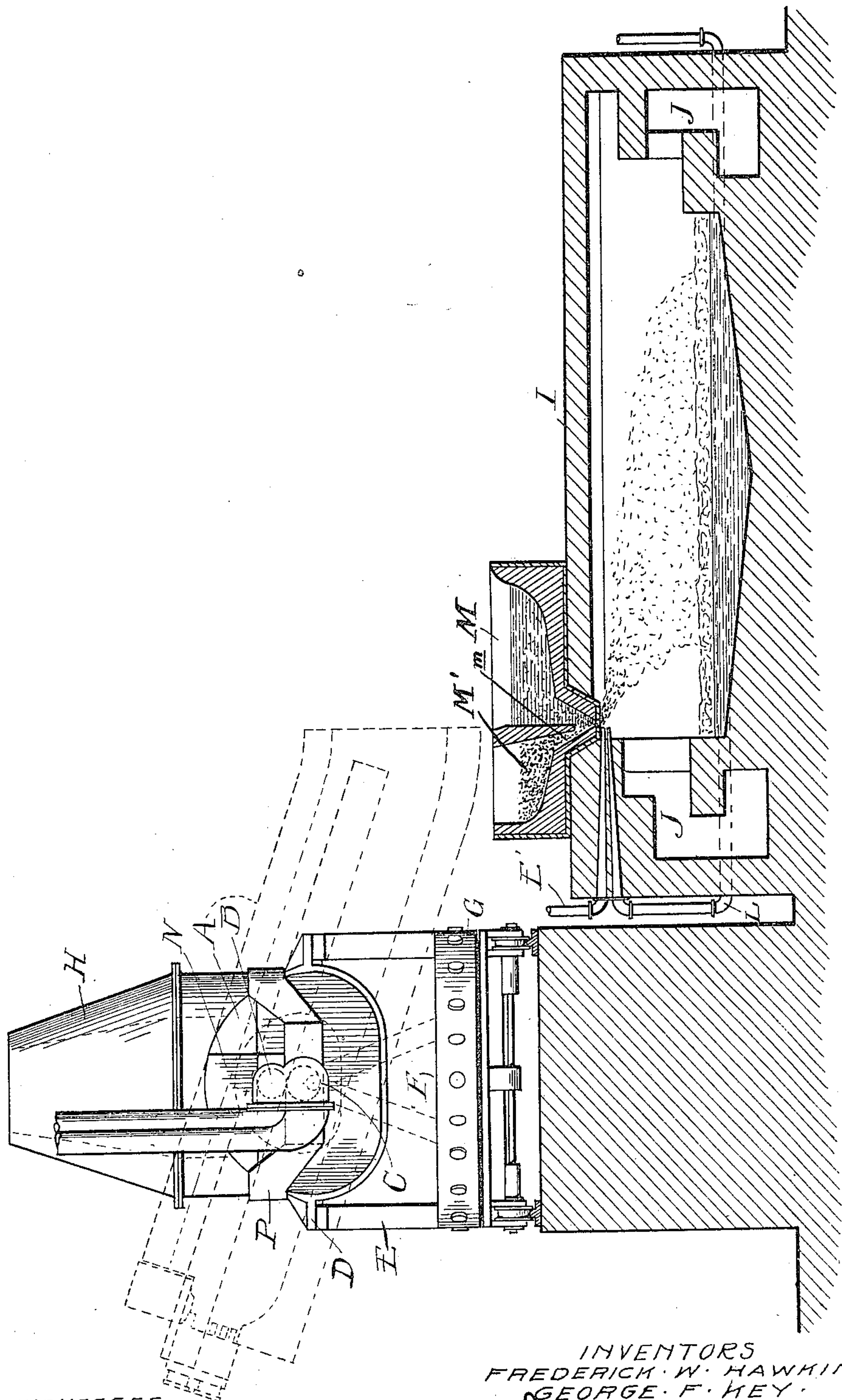


FIG. 1.

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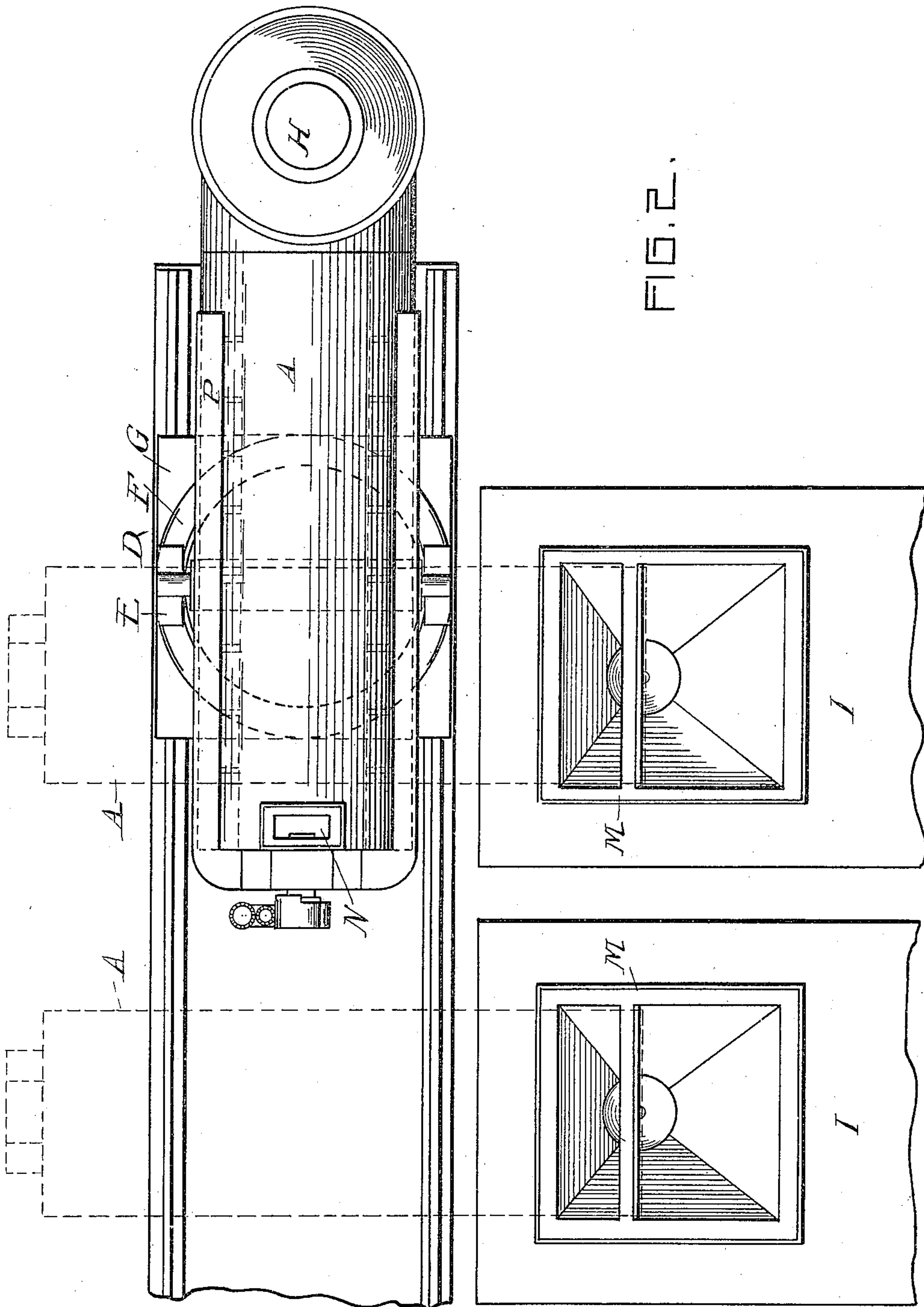
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

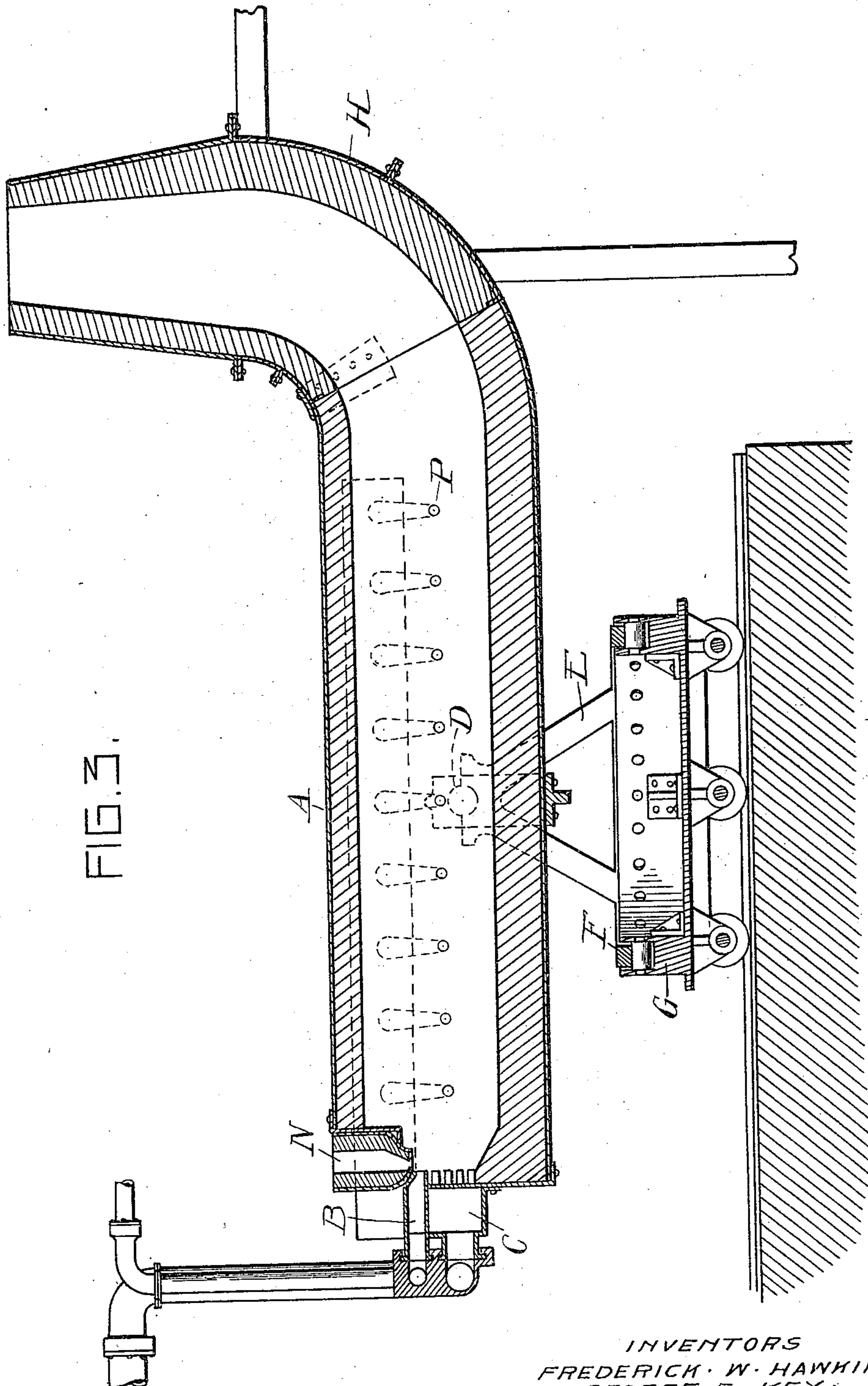


FIG. 3.

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UNITED STATES PATENT OFFICE.

FREDERICK W. HAWKINS AND GEORGE F. KEY, OF DETROIT, MICHIGAN, ASSIGNORS
TO THE GLOBE STEEL FILTRATION PROCESS COMPANY, OF DETROIT, MICHIGAN, A
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IRON-REFINING FURNACE.

949,475.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed May 21, 1906. Serial No. 318,054.

To all whom it may concern:

Be it known that we, FREDERICK W. HAWKINS and GEORGE F. KEY, citizens of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Iron-Refining Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to an apparatus for refining iron, and the invention consists in the construction as hereinafter set forth.

In the drawings, Figure 1 is a longitudinal section through the apparatus; Fig. 2 is a plan view of a portion thereof; and Fig. 3 is a section at right angles to Fig. 1.

A is a preparatory furnace consisting of a normally horizontally arranged casing, which is lined with suitable refractory non-basic material. At the front end of this casing is arranged a steam twyer B, and below this is a series of air twyers C, all of which twyers are arranged to direct their jets (separately or otherwise) longitudinally of the furnace. The casing A is pivotally secured by trunnions B to standards E, which latter are preferably mounted upon a turntable F upon a suitable pedestal G. This mounting permits of swinging the furnace A in a horizontal plane and also of tilting the same so as to permit of emptying the contents from the furnace chamber.

H is a stationary flue with which the open end of the casing A is adapted to register. This flue has an upturned end which forms an outlet for the gases of combustion within the furnace A. I is a second furnace arranged upon a lower plane, and associated in such relation to the furnace A that the contents of the latter may be discharged into the former by the rotation of the turntable and the swinging of the casing upon its pivots. The furnace I is provided upon opposite sides with gas inlet channels, preferably connected with regenerating chambers J of any suitable construction.

E' is a steam twyer entering one end of the furnace I, and L is an air twyer arranged below the steam twyer E'.

Both furnaces A and I are provided at their forward ends with wells or receptacles N and M for receiving the molten metal to

be treated. The receptacle N is adapted to receive the crude molten metal, which is discharged through a narrow slit in the bottom of the receptacle into the chamber of the furnace A and directly in the path of the jets issuing from the twyers B and C. The receptacle M is so located as to receive the metal poured from the furnace A when the latter is tilted, and this receptacle is also provided with a restricted discharge opening through which the metal falls into the furnace I directly into the path of the jets from the twyers E' and L.

With the construction as described, in operation the furnace A is first arranged in its horizontal position, where the open end thereof will be in registration with the escape flue H. The crude molten metal is then fed into the receptacle N and at the same time air or steam, or both, are injected into the furnace chamber through the twyers B and C. The effect will be to atomize the molten metal which passes through the slit in the receptacle N to scatter the minute particles over the bottom of the furnace throughout its length. The metal will thus collect upon the bottom of the furnace, which at its opposite ends is upturned to form a shallow pan. Air is also admitted through side twyers P, so as to blow over the surface of the metal and assist in oxidation; thus the metal while in the furnace A will be subjected to an oxidizing treatment which will eliminate the greater portion of the silicon, manganese, carbon and other oxidizable impurities. When the treatment in the furnace A is completed, said furnace is turned upon the table F to extend transversely to its normal position, the furnace is then tilted upon its trunnions, which will permit the metal within the chamber to be discharged through the open end and received by the receptacle M. From this receptacle the partially purified molten metal again falls into the path of the air and steam issuing from the twyers E' and L, with the result that it is a second time atomized. The bottom of the furnace I is covered with a layer of comminuted basic material, which latter is raised to a high temperature by the combustion of the gases entering from the regenerating chamber. Thus the metal after a second atomizing process will be scattered

over this basic bed, and the separated particles will percolate through the basic mass, finally collecting below the same.

Contiguous to the receptacle M is an auxiliary receptacle M' having an outlet *m*, the auxiliary receptacle adapted, if desired, to contain comminuted basic material to be infused in the molten metal.

It will be understood that by this treatment the oxidizable impurities, such as silicon and manganese, are first removed and other impurities, such as phosphorus and sulfur, may be removed by the percolating process.

What is claimed is,—

1. In an apparatus for refining metal, a furnace having a stationary flue with which said furnace is normally registered, a mounting for said furnace permitting of moving the same out of registration with the stationary flue and tilting it to discharge the molten metal therefrom, a second furnace in a plane beneath said first mentioned furnace and a receptacle for receiving the molten metal from the first furnace provided with a discharge through which the metal is fed to the second furnace.

2. In an apparatus for refining metal, the combination with a plurality of furnaces, each provided with means for atomizing the molten metal therein, of a furnace located on a higher plane, also provided with means for atomizing the metal, and means whereby the last-mentioned furnace may be conveyed to discharge its contents alternatively to the lower furnaces.

3. An apparatus for refining metal comprising a horizontal furnace, a receptacle for feeding the molten metal to said furnace having a restricted discharge opening, a receptacle for receiving the discharge from said horizontal furnace provided with a restricted discharge opening, a second furnace into which the molten metal is discharged from said receptacle, and means for atomizing the molten metal as it enters each furnace.

In testimony whereof we affix our signatures in presence of two witnesses.

FREDERICK W. HAWKINS.

GEORGE F. KEY.

Witnesses:

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