

No. 694,970.

Patented Mar. 11, 1902.

W. KENT.

REVERBERATORY PUDDLING OR BOILING FURNACE.

(Application filed May 24, 1901.)

(No Model.)

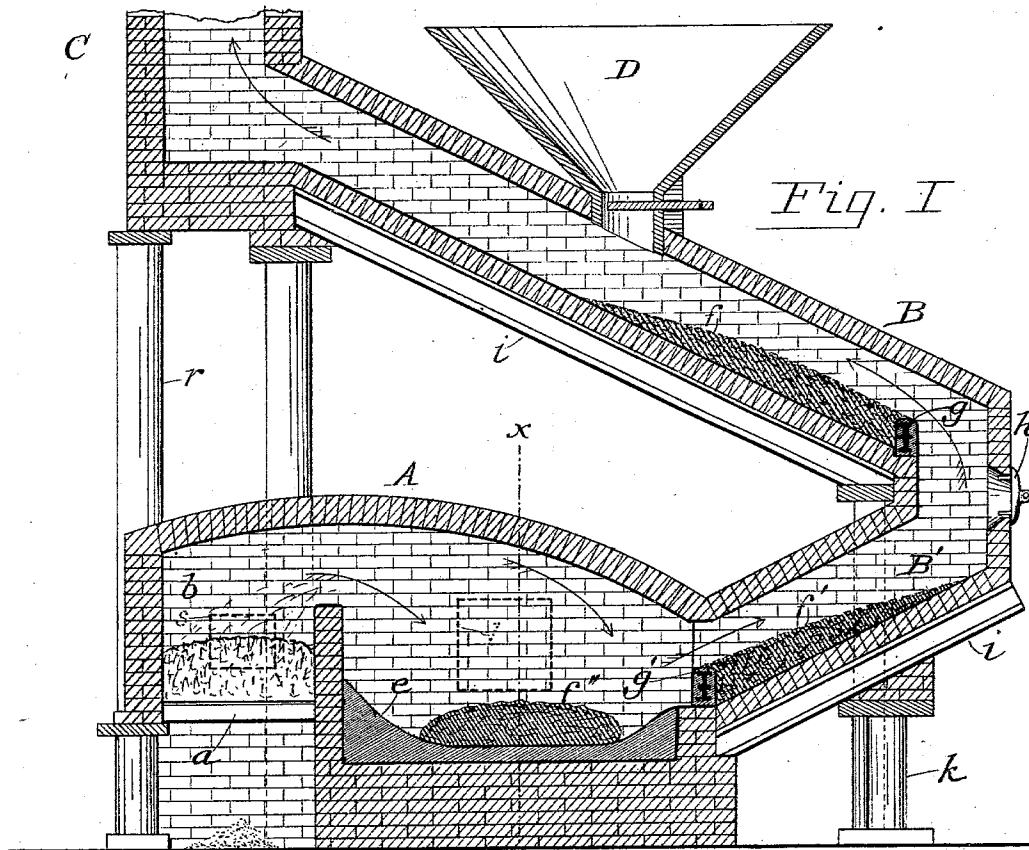


Fig. I

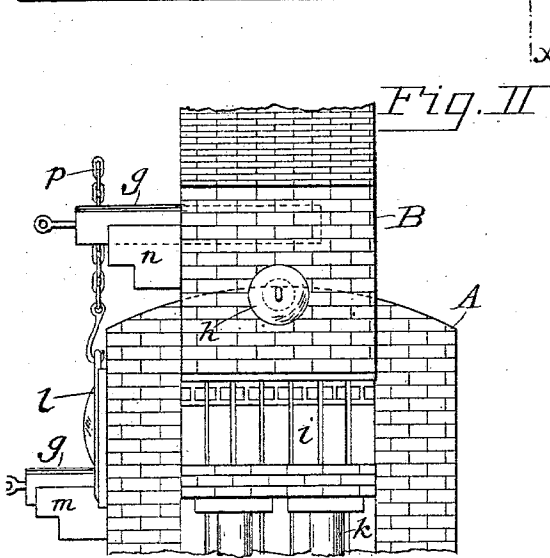


Fig. II

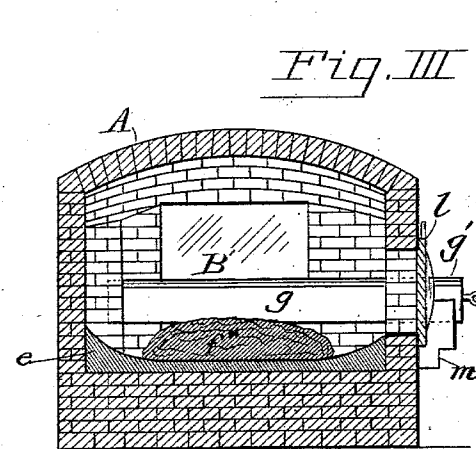


Fig. III

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UNITED STATES PATENT OFFICE.

WILLIAM KENT, OF COVINGTON, KENTUCKY.

REVERBERATORY PUDDLING OR BOILING FURNACE.

SPECIFICATION forming part of Letters Patent No. 694,970, dated March 11, 1902.

Application filed May 24, 1901. Serial No. 61,740. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KENT, a citizen of the United States, residing at Covington, in the State of Kentucky, have invented a certain new and useful Reverberatory Puddling or Boiling Furnace, of which the following is a specification.

My invention relates to the iron-working art; and it consists, primarily, in the construction of a furnace which allows of charging the hearth of the furnace with metal already heated and without opening the melting-chamber to the cold air and in utilizing the heat of the escaping flame and gases therefrom to heat the charge before introduction to the melting-chamber.

In the accompanying drawings I show a reverberatory furnace constructed according to my invention.

Figure I is a vertical section lengthwise of the flues; Fig. II, a partial view, in elevation, from the right-hand end of the same; and Fig. III, a vertical section along the line xx of Fig. I.

In this class of furnaces for puddling or working up metal to be hammered or rolled into wrought-iron bars, &c., there is a melting-chamber A , partly partitioned off from a fire-chamber b , and generally a direct flue B' leads at once into a stack or chimney, which would be placed at the right in the figure. The melting-chamber has a door l , (indicated by broken lines in Fig. I,) through which the ball of metal after working is removed and through which, as now constructed, the charge is introduced to be heated and worked, being generally shoveled in. This makes it inevitable that the chamber A becomes cooled while it is being charged and also by the cold metal coming in contact with it. The flame after "reverberating" in chamber A proceeds up the chimney at a temperature of some 3,000° Fahrenheit, and this heat is wasted and is further injurious to the chimney, so that a metal stack cannot be used at this place. The heating and sudden cooling of chamber A are injurious to the brickwork and in a very short time cracks and destroys the lining.

In my furnace there is a fire at b , as of coal burned on the grate-bars a , or a gas-flame. The hearth is lined with a slag or "fix" coating e . The flame proceeds up the slanting

flues B' and issues at the stack or chimney C . The flues may be built of brick laid on the I-beams z , which are supported by pillars k and r , as shown. In the return portion of the flue B , I place a hopper D or other means of introducing the metal therein, which latter may be in the form of broken pig or wrought scraps or iron "swarf." It falls on the bottom of the inclined flue B , which being made of quite smooth brick allows the charge to slide down at the proper time into the branch B' by the withdrawal of the gate-stop or charge-block g . The charge again is allowed to slide into the hearth e by sliding out the gate or charge-block g' at the proper time. Thus the charge is subjected to the heat of the escaping flame beforehand and is introduced into the hearth already heated nearly to the melting-point. The charge is introduced without any interruption of the draft or the cooling of any of the parts, and it may be regulated at pleasure, both in volume and in temperature. When the mass or ball of puddled iron f'' is removed to be worked under the hammers or in the rolls or the "squeezers," a fresh charge is introduced at once and without interruption or cooling. While the metal is in the inclined flues, I may mix charcoal with it, which being slowly oxidized and heated together with the metal the iron absorbs carbon and produces "charcoal iron." The furnace is particularly valuable for this function.

The charge-blocks $g g'$ may be made of fire-clay built around a central frame of iron, as indicated by the section in Fig. I. They slide in smooth slots $m n$ at the side and may have a long lever attached at the end to facilitate moving them. The door l may have a hook and chain p , attached to an overhead lever, to slide it in its guideways for opening, as indicated in Fig. II. In the elbow of the inclined flues I make a small opening closed by a door h , through which may be introduced a rake to move the metal $f f'$ in either flue in case of any stoppage and also to clean the flues.

I am aware that furnaces have been built in which there are several flat-bottomed chambers of different stages of heat and others in which the charge is introduced suddenly down a slanting flue, as shown in the patent

to Ludwig, No. 505,112, where there is no previous heating done, but

What I claim as new, and desire to secure by Letters Patent, is the following:

5 1. A reverberatory furnace having a hearth, an open flue connected thereto for escaping flames and for feeding a charge to the hearth, inclined to allow the ore to slide by gravity thereto, means for introducing the charge
10 into the flue by gravity and a removable gate of less height than the flue to hold the charge in place on the floor of the flue, without interrupting the draft.

2. A furnace having a hearth and several
15 inclined connecting-flues arranged in vertical series between the hearth and the chimney intersecting at an angle with each other, means for introducing a charge of metal into the uppermost of the flues, means for retaining
20 it in place on the inclined floor of each flue and for releasing the charge to slide downward into the lower flues and into the hearth.

3. A reverberatory furnace having a hearth
25 and two inclined flues directly connecting therewith and intersecting at an acute angle, means for retaining and releasing a charge of metal on the inclined floor of each flue and an opening in the elbow of the flues for the
30 introduction of a tool to rake the bottoms of both flues.

4. A furnace having a hearth and several inclined draft and charging flues directly connecting therewith, a hopper for introducing
35 a metal charge into the flue and removable stops manipulable from outside to retain the charge on the inclined floors of the flues to heat the same before introducing into the hearth by the escaping flames from the hearth.
40 5. A furnace having a reverberatory melt-

ing-chamber, a fire-chamber, a chimney over the fire-chamber, two intersecting inclined flues connecting the melting-chamber and the chimney, means for introducing a charge
45 for the furnace into the upper flue and means for retaining and releasing the charge on the inclined floors of the flues, whereby a heated fresh charge is fed to the melting-chamber without opening the same to outside air or interrupting the draft.

6. A reverberatory furnace having a hearth and open flues for conducting off the flames therefrom, said flues being sufficiently inclined to allow a charge of metal to slide
55 therein and fall by gravity into the hearth and having removable stops or gates of less height than the flue, located at various distances from the hearth for retaining charges in the flues subject to the action of the flames and releasing the charges at pleasure, to slide
60 into the hearth, without opening to the outside air.

7. A furnace having a reverberatory melting-chamber, a fire-chamber, an inclined flue-section proceeding from the melting-chamber
65 and a returning-section oppositely inclined and connecting the first section with a chimney, each flue-section being open for full draft and having therein removable stops of less height than the flue to temporarily retain on
70 its floor a charge of metal to be heated by the flames before introduction to the melting-chamber.

In testimony whereof I have hereunder signed my name in the presence of the sub-
75 scribed witnesses.

WILLIAM KENT.

Witnesses:

A. AMENT,
CHAS. H. URBAN.