

J. W. BONTA.

FURNACE FOR MELTING COPPER.

No. 182,058.

Patented Sept. 12, 1876.

Fig. 1.

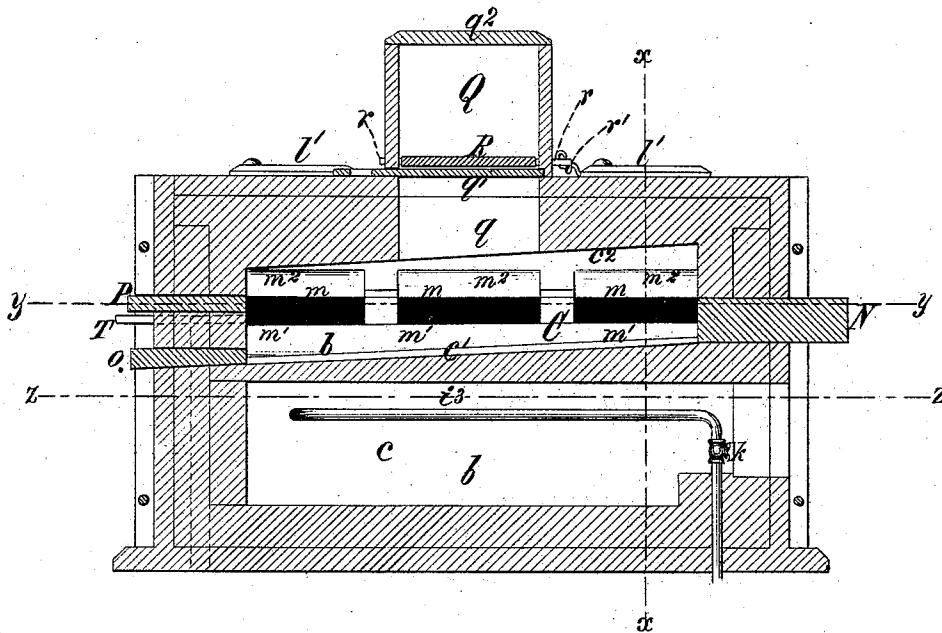
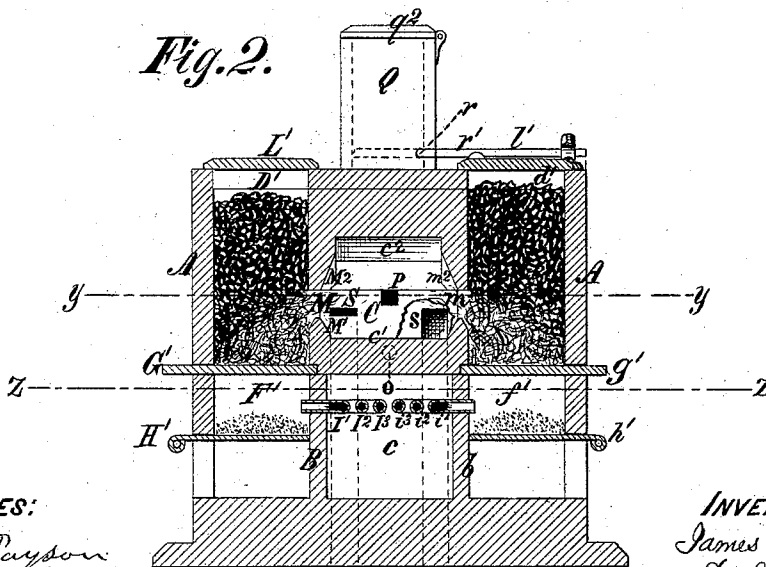


Fig. 2.



WITNESSES:

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Fig. 3.

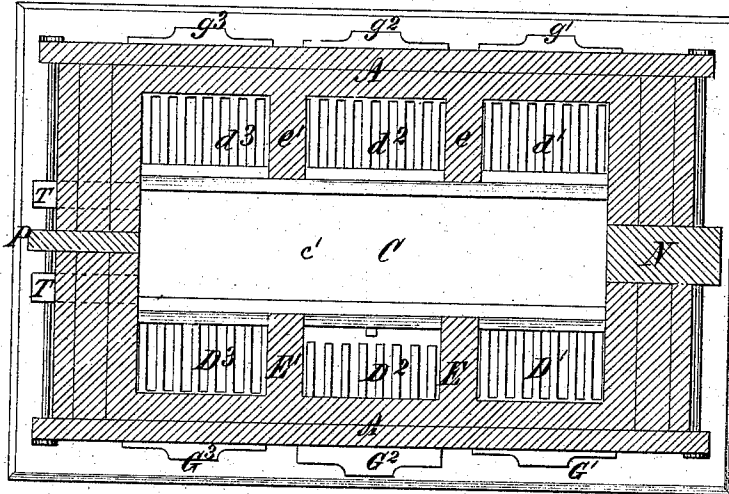
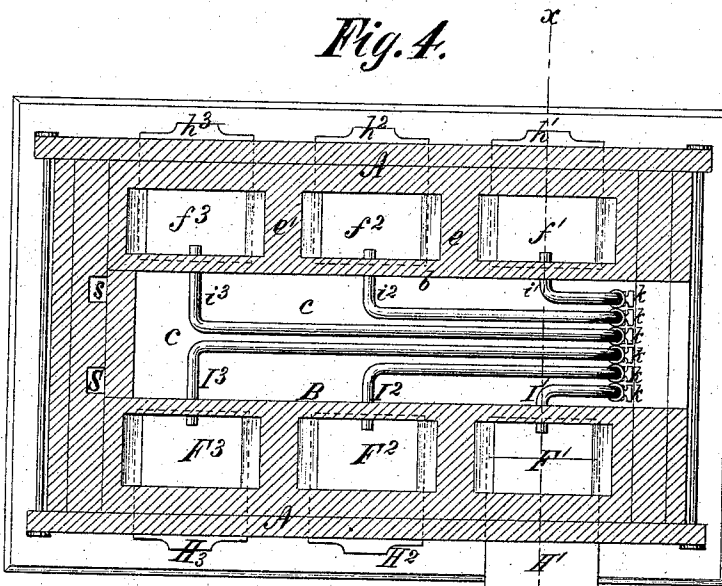


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN FURNACES FOR MELTING COPPER.

Specification forming part of Letters Patent No. 182,058, dated September 12, 1876; application filed April 5, 1876.

To all whom it may concern:

Be it known that I, JAMES W. BONTA, of New Brighton, Pennsylvania, have invented certain Improvements in Furnaces for Melting Copper and other metals, of which the following is a specification:

My improvement relates to base-burning coal-magazine furnaces, in which the coal is partially coked before it descends to the grate-surface, and the necessary amount of oxygen is supplied by air-blasts introduced into a closed ash-pit.

My invention consists in establishing a melting-chamber having an inclined bed between two series of coal-magazines, such as herein-after described, and in providing the melting-chamber with openings for various purposes, as follows, respectively: For admitting the flames from the coal-magazines; for admitting the charge of metal to be melted; for drawing off the molten metal; for allowing access to the interior for the purpose of cleaning the bed; for permitting the inspection of the interior, and for the discharge of the uninflam-mable gaseous products of combustion, the latter openings being provided with valves, by means of which the pressure in the furnace is regulated.

My coal-magazines are situated over closed ash-pits, from which they are separated by grate-bars, and the opposed sides of the magazines have narrow openings a short distance above the grate-bars, through which the flames from the burning fuel are forced by the effect of blasts of air injected into the ash-pits.

The space between the magazines is covered, and constitutes a reverberatory chamber, the bottom of which is inclined longitudinally; and at its highest end is situated a short distance below the horizontal openings in the coal-magazines.

The coal-magazines are closed at the top by tight-fitting doors, in the usual way.

The reverberatory chamber is lined with fire-brick, and its roof is perforated in the center to communicate with a charging-chamber arranged on the top of the furnace. The opening in the roof of the reverberatory chamber is closed by a fire-brick slide. The charging-chamber is provided with a tight-fitting movable cover at the top, and a movable bot-

tom, swinging upon a horizontal axis just above the fire-brick slide.

The accompanying drawings, exhibiting my improved furnace, are as follows: Figure 1 is a longitudinal vertical section through the center of the melting-chamber and charging-chamber. Fig. 2 is a transverse vertical section through the dotted line *xx*. Fig. 3 is a horizontal section through the dotted line *yy*. Fig. 4 is a horizontal section through the dotted line *zz*.

Referring to the drawings, *A a* represent the side walls of my furnace; *B b*, the inner walls, extending from end to end, by which the interior is divided into three parts. The upper central portion of the furnace is occupied by the melting-chamber *C*, and the lower central portion by the dead-air chamber *c*. The upper outer portion of the furnace, on either side of the melting-chamber, are, respectively, occupied by the coal-magazines *D¹ D² D³ d¹ d² d³*. The magazines, on either side, are separated from each other by the transverse walls *E E' e e'*, which extend down to the base of the furnace, and also separate from each other the ash-pits, on either side, which are, respectively, indicated by the letters *F¹ F² F³ f¹ f² f³*.

The magazines are provided, respectively, with movable grate-bars *G¹ G² G³ g¹ g² g³*, and their ash-pits are respectively closed at the bottom by the tight-fitting slides *H¹ H² H³ h¹ h² h³*. Air is injected into the furnace through the several blast-pipes *I¹ I² I³ i¹ i² i³*. These blast-pipes are each provided with a valve, *k*, for regulating the blast. The coal-magazines are each provided with a movable cover, *L' U'*. The inner walls separating the coal-magazines from the melting-chamber are perforated by the horizontal openings *M m*, for the passage of the flames from the incandescent coal into the melting-chamber. The melting-chamber has an inclined bottom, *c¹*, and an inclined ceiling, *c²*. The inclined bottom or bed *c¹* of the melting-chamber is situated a short distance below the horizontal openings from the coal-magazines. The wall at the higher end of the melting-chamber has an opening closed by the movable plug *N*, to allow access to the chamber at that point, for the purpose of cleaning the bed. The wall of the lower end

of the melting-chamber is provided with an opening closed by the movable plug O, for drawing off the molten metal from the bed. One or more peek-holes are made at convenient points, to allow inspection of the interior of the melting-chamber. One of these peek-holes, closed by the movable plug P, is shown in Fig. 1 of the drawings. Metal to be melted is fed into the melting-chamber from the charging-chamber Q on the top of the furnace. The charging-chamber is arranged immediately over a vertical opening, *q*, in the roof of the melting-chamber. This opening is closed by the movable fire-brick slide *q*¹. The bottom of the charging-chamber R is affixed to the horizontal shaft *r*, and swings downward, when the fire-brick slide is withdrawn, and thus discharges into the melting-chamber the material theretofore deposited in the charging-chamber. The horizontal shaft *r* projects through the end wall of the charging-chamber, and is provided with a crank, *r*¹, by means of which the bottom is swung upward into place after its load has been discharged, thus permitting the replacing of the fire-brick slide *q*¹. The charging-chamber is provided with a tight-fitting cover, *q*². This cover is removed for the purpose of filling the charging-chamber with the material to be melted, and is then replaced, prior to the withdrawal of the fire-brick slide and the discharge of the contents of the charging-chamber into the melting-chamber. The unflammable gaseous products of combustion are discharged from the melting-chamber through the downward flues S s.

In Fig. 2 of the drawings a portion of the end wall of the melting-chamber is represented as broken away, for the purpose of showing the downward flue *s*. The mouth of the other flue, S, is seen upon the opposite side of the central portion of the drawings, Fig. 2.

The side walls of the melting-chamber, above and below the horizontal openings M *m*, are beveled toward the openings, as shown at M¹ M² *m*¹ *m*².

The operation of my furnace is as follows: The magazines are filled with coal, which, being ignited at the bases of the magazines, is kept supplied with oxygen by means of the air-blast pipes, which inject air into the ash-pits, from which it is forced upward through the grate-bars. The coal contained in the magazines is partially coked before it is consumed, and the magazines are filled with gas. The excess of gas generated in the magazines finds its way out through the horizontal opening M *m*, where it is inflamed, and contributes by its combustion to the heating-power of the furnace. The flames from the incandescent coal and gas are forced by the air-blasts into the melting-chamber through the horizontal openings upon the opposite sides thereof, and respectively reverberate in opposite directions, concentrating their heat upon the bed of the melting-chamber.

In the use of my improvement for melting copper and other metals, there are two advantages: First, the great heating-power of the furnace, which results from the double reverberation of the flames, which I have described, and the mode of charging the furnace, by which I guard against the escape of heat from the melting-chamber during the process of charging it with metal to be melted.

Secondly, the prevention of the escape of metallic vapors from the furnace, which is a consequence of the use of the downward flues for the outlet of the unflammable products of combustion. Metallic vapors collect upon the roof of the melting-chamber, and finally condense and fall back upon the bed. Only a comparatively small portion of them escape from the downward outlets S s.

It will, of course, be understood that the area of the outlets for the escape from the melting-chamber of the unflammable products of combustion will be varied, according to circumstances, in proportion to the area of the grate-surface and the quantity of fuel consumed.

As the object of the outlets S s is simply to provide for the escape of the carbonic oxides from the furnace, their inner mouths are arranged as low as possible. It will be seen that the lower edge of the mouths of the outlets is in the same plane with the lower boundary of the horizontal openings M *m*, or, in other words, in the same plane as the upper edge of the side walls of the melting-chamber bed.

The outlets for the discharge of the carbonic oxides are provided with the valves or dampers T for the purpose of regulating, in conjunction with the air-blast valves, the pressure maintained in the furnace.

I claim as my invention, in a furnace for melting copper and other metals—

1. The double series of base-burning coal-magazines, arranged over two corresponding series of closed ash-pits, provided with pipes for injecting blasts of air, in combination with a melting-chamber, substantially such as described, situated between the coal-magazines, and having narrow openings in its opposite side walls, a short distance above its bed, for admitting the flames from the lower parts of the coal-magazines, substantially as set forth.

2. A series of base-burning coal-magazines, substantially such as described, and a melting-chamber having an inclined bed, in combination with downward flues leading from the melting-chamber, the inner mouths of the said flues being at, or nearly at, the same level as the lower boundary of the openings in the side walls of the melting-chamber bed, substantially as described.

JAMES W. BONTA.

Witnesses:

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EDWD. PAYSON.