

(No Model.)

B. PROBERT & M. DAVIN.

PUDDLING FURNACE.

No. 251,941.

Patented Jan. 3, 1882.

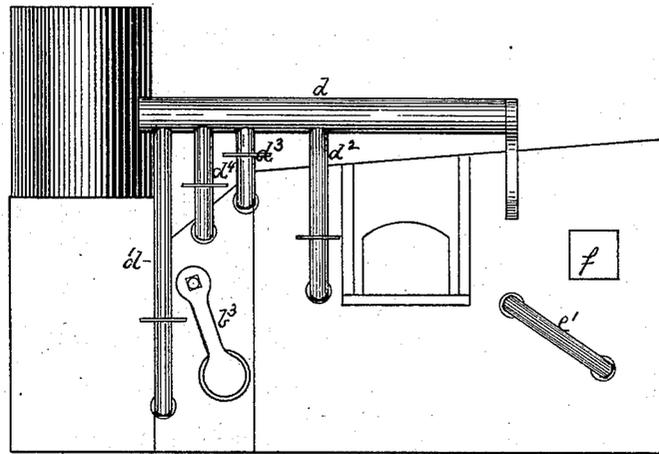


Fig. 1.

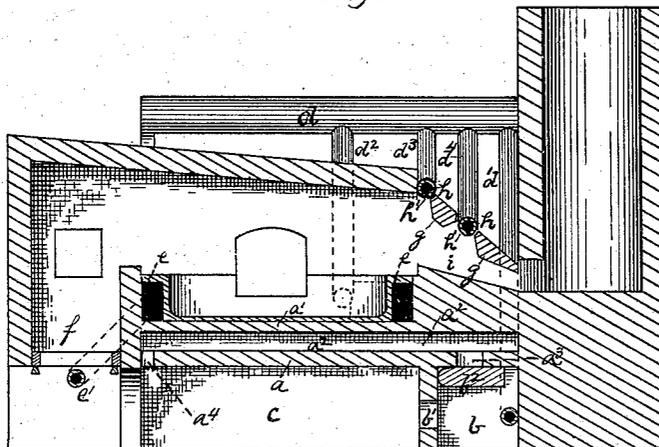
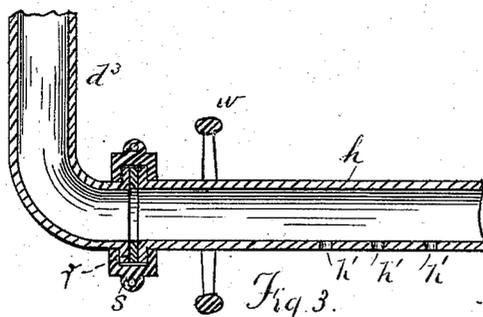


Fig. 2.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

BENJAMIN PROBERT AND MICHAEL DAVIN, OF ALLEGHENY, PA.

## PUDDLING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 251,941, dated January 3, 1882.

Application filed October 3, 1881. (No model.)

To all whom it may concern :

Be it known that we, BENJAMIN PROBERT and MICHAEL DAVIN, both of the city of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Puddling-Furnaces; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of our improved puddling-furnace, and Fig. 2 is a sectional view of the same. Fig. 3 is an enlarged sectional view, showing one method of connecting the pipes  $h h$  with blast-pipes  $d^3 d^4$ , whereby the pipes  $h$  may be rotated to change the direction of the blast between the cramps.

Like letters of reference indicate like parts wherever they occur.

Our invention consists in certain improvements in puddling-furnaces, designed particularly to prevent the burning of the bottom and chills, and also to prevent the rapid burning of the cramps forming the covering of the flue of the furnace, and also to heat the blast or draft of air which passes into the fire-box.

In all puddling-furnaces there are certain parts which are exposed to an intense heat, which rapidly fuses or burns the brick, making frequent repairs to the furnace necessary. It is the object of our invention to prevent and lessen as far as possible this injury to the different parts of the furnace.

We will now describe our invention, so that others skilled in the art may manufacture and use the same.

Under the hearth of the furnace we construct a false bottom,  $a$ , so as to leave a space,  $a^2$ , between the bottom  $a'$  and the false bottom. Under the rear portion of the space  $a^2$  is an air-chamber,  $b$ , which communicates by an opening,  $a^3$ , with the rear end of the space  $a^2$ . In the front wall of the air-chamber  $b$  is an opening,  $b'$ , extending into the space  $c$  in front of the air-chamber. Inside of the air-chamber  $b$  is a valve,  $b^2$ , which may be raised so as to close the opening  $a^3$ , or lowered so as to close the opening  $b'$  by means of a crank,  $b^3$ . At the forward end of the space  $a^2$  is an opening,  $a^4$ , into the space  $c$  under the false bottom  $a$ .

A blast-pipe,  $d$ , supplied with a blast in any

desired way, is provided, leading from which to the air-chamber  $b$  is a branch pipe,  $d'$ . From the blast-pipe  $d$  another branch pipe,  $d^2$ , leads to and discharges into the chills  $e$  of the furnace, and leading from the chills  $e$  to a point under the bars of the fire-box  $f$  is a discharge-pipe,  $e'$ .

Between the cramps  $g g$  are pipes  $h h$ , provided with perforations  $h'$ . These pipes connect with the blast-pipe  $d$  through pipes  $d^3 d^4$ . These pipes  $h h$  are so arranged that they can be turned on their axes to direct the current of air to any part of the flue  $i$ , so as not to impede the current of air passing into the working-chamber of the furnace. In the present instance (see Fig. 3) a ring,  $r$ , is inserted between the flanges of pipes  $d^3$  and  $h$ , and the pipes are then coupled by means of a separable box,  $s$ , in such manner as to permit the axial rotation of the pipe  $h$  by means of a hand-wheel,  $w$ , applied for the purpose; but any other convenient construction may be adopted at will. Where two or more perforated pipes  $h h$  are employed to deliver a blast in the neck of the furnace they may be arranged to direct the blast in opposite directions, and the blast may be delivered through either pipe, according as it may be found desirable to facilitate or retard the draft.

The operation is as follows: The blast from the pipe  $d$  passes through the pipe  $d'$  into the air-chamber  $b$ , and thence through the opening  $a^3$  into the space  $a^2$ . Passing through the space  $a^2$ , the air is heated and cools the bottom of the hearth, and is then discharged through the opening  $a^4$ , whence it passes through the bars into the fire-chamber  $f$ . Air from the blast-pipe  $d$  also passes into the chills  $e$  through the pipe  $d^2$ , and is thence discharged through the pipe  $e'$  to a point under the fire-chamber  $f$ . This draft cools the chills and heats the air. The air which passes through the perforations in the pipes  $h h$  may be directed in the required direction to cool the cramps without interfering with the draft through the furnace, and as the blast will be in a direction away from the cramps, it will prevent the flame, &c., from impinging on the covering of the flue, and will thus tend to effectually protect the same. The blast may be directed above or below the false bottom  $a$  by means of the valve  $b^2$ .

The device for directing a current of cold

air against the brick-work of the flue *i* to prevent the burning of the cramps may be applied to other parts of the furnace where there is a liability to melting or burning.

5 The advantages of our invention are that the temperature of the blast, as well as of the hearth, may be controlled at will, and the direction of the blast in the cramps or throat may be made to impede or facilitate the draft  
10 of the furnace.

We are aware that a rotating perforated pipe has heretofore been arranged at the cramps in such manner as to deliver a blast into and over the hearth, and also that a like pipe has  
15 been placed at the bottom of the flue, in order to deliver a blast into or over the hearth, and also up the chimney to increase the draft, and do not herein claim the same, for the reason that neither construction is adapted to direct  
20 the blast, &c., away from the cramps or cover of the flue in such manner as to protect the same.

Having thus described our invention, what we claim, and desire to secure by Letters Patent,  
25 is—

1. In a puddling or boiling furnace, the combination, with the hearth and fire-box, of a false bottom or horizontal partition which divides  
30 the space below the hearth into two horizontal chambers that communicate with each other and with the ash-pit of the fire-box, a blast-pipe which delivers into one of said horizontal chambers, and a valve arranged to direct the blast into either of said chambers at the will  
35 of the operator, substantially as and for the purpose specified.

2. The combination, with the throat or cramps

of a puddling or boiling furnace, of two blast-pipes arranged to deliver the blast in reverse directions, substantially as and for the purpose specified. 40

3. In a puddling or like furnace, the combination, with the throat thereof, of an axially-rotatable perforated blast-pipe and the recessed roof or cover, the elements relatively  
45 arranged substantially as described, whereby the pipe may be made to deliver a blast into the throat or over the hearth and away from the cover of the flue, substantially as and for the purpose specified. 50

4. In a puddling or boiling furnace, the combination, with the hearth *a'* and fire-box *f*, of the horizontal chambers *a<sup>2</sup> b c*, which communicate by ports *a<sup>3</sup>, a<sup>4</sup>*, and *b'*, the valve *b<sup>2</sup>*, adapted to close either port *a<sup>3</sup>* or *b'*, and a  
55 blast-pipe which delivers into chamber *b*, substantially as and for the purpose specified.

5. In a puddling or boiling furnace, the combination, with the fire-box *f*, hearth *a'*, and cramps *g*, of the series of air-chambers *a<sup>2</sup> b c*,  
60 having ports *a<sup>3</sup> a<sup>4</sup> b'*, and valve *b<sup>2</sup>*, and the blast-pipe *d*, having the branch pipes *d<sup>1</sup> d<sup>2</sup> d<sup>3</sup> d<sup>4</sup>*, which deliver into the cramps, hearth-chill, and air-chamber *b*, respectively, the elements  
65 being relatively arranged substantially as and for the purpose specified.

In testimony whereof we have hereunto set our hands this 13th day of September, A. D. 1881.

BENJAMIN PROBERT.  
MICHAEL DAVIN.

Witnesses:

R. H. WHITTLESEY,  
L. C. FITLER.