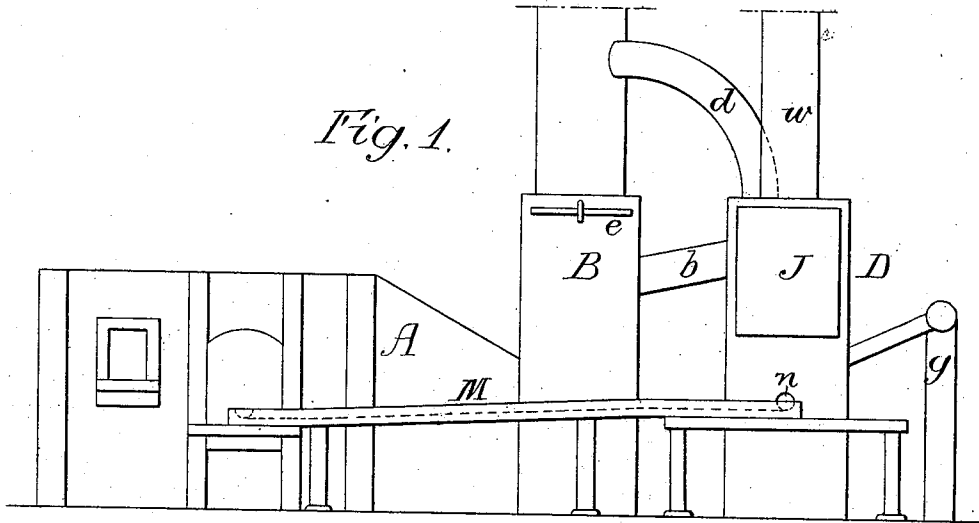
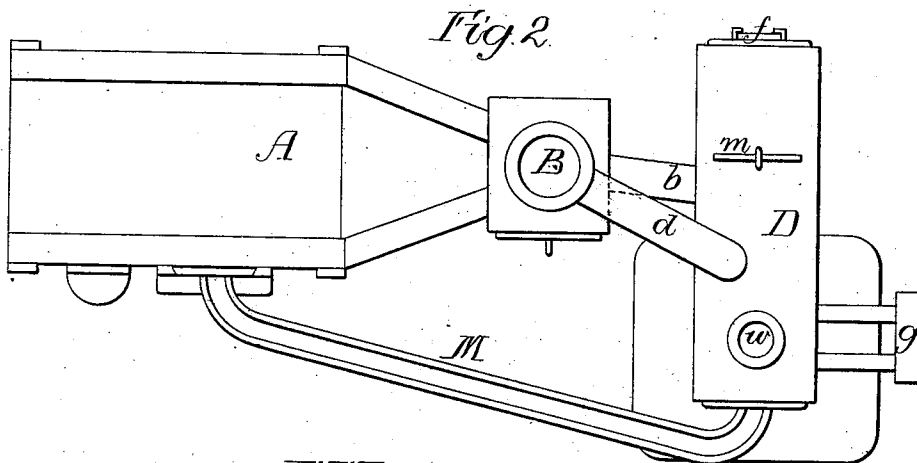
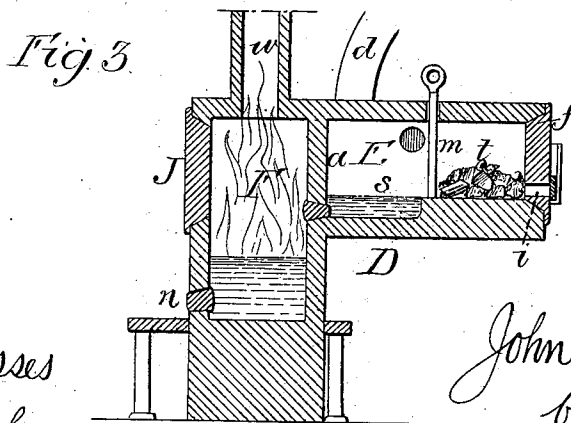


J. D. WILLIAMS.
Attachment for Puddling Furnaces.

No. 227,339.

Patented May 4, 1880.



Witnesses

Henry Howson Jr.
Harry Smith

Inventor
John D. Williams
by his Attorneys
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UNITED STATES PATENT OFFICE.

JOHN D. WILLIAMS, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO JAMES P. FLEMING AND HENRY CROKER, OF SAME PLACE.

ATTACHMENT FOR PUDDLING-FURNACES.

SPECIFICATION forming part of Letters Patent No. 227,339, dated May 4, 1880.

Application filed December 15, 1879.

To all whom it may concern :

Be it known that I, JOHN D. WILLIAMS, of Allegheny city, Pennsylvania, have invented a new and useful Improvement in Attachments for Puddling-Furnaces, of which the following is a specification.

The object of my invention is to increase the capacity and improve the product of a puddling-furnace without incurring additional expense in working; and this object I attain by utilizing the waste products of combustion of the puddling-furnace in connection with a supplementary furnace having heating, melting, and purifying chambers, whereby the iron may be melted and purified before being introduced into the puddling-chamber.

In the accompanying drawings, Figure 1 is a front view, and Fig. 2 a plan view, of a puddling-furnace with my improved melting and refining attachment; and Fig. 3, a transverse section of said attachment.

A represents an ordinary puddling-furnace, of which B is the chimney or stack. At one end of the furnace, adjacent to the chimney B, is a structure, D, partly horizontal and partly vertical, the horizontal portion of the structure containing a chamber, E, and the vertical portion a chamber, F, said chambers E and F being separated from each other, however, by a partition, *a*, in which, at a point close to the bottom of the chamber E, is an opening, as shown in Fig. 3.

The chimney B communicates with the chamber E through pipes *b* and *d*, a damper, *e*, being arranged in the chimney at a point between the mouths of said pipes *b* and *d*, so that by properly adjusting said damper the products of combustion from the furnace A may be caused to pass through the chamber E before escaping from the chimney.

The chamber E is closed at the end by means of a door, *f*, in which is an opening, *i*, closed by a sliding cover, and said chamber E is divided by a sliding partition, *m*, into two parts, *s* and *t*, for the purpose described hereinafter.

Tuyeres are formed in one side of the vertical portion of the structure D, these tuyeres communicating with the branches of the blast-pipe *g*.

The front of the vertical portion of the structure D has a door, J, and a tapping-hole, *n*, the door J being opposite, or nearly opposite, the end of the chamber E, and the tapping-hole *n* being located at the lower end of the chamber F.

The operation of the apparatus is as follows: Fire being started in the puddling-furnace, the damper *e* is so adjusted that the products of combustion will pass through the pipes *b* and *d* and chamber E, or rather through that portion of said chamber between the partitions *a* and *m*, the latter being closed. A charge of pig-iron is introduced into the portion *t* of the chamber E, the door *f* being then closed and the partition *m* raised, so that the products of combustion fill the entire chamber E. The use of the partition *m* is to prevent any interference with the draft of the furnace owing to the opening of the door *f*. When the charge has been properly heated a suitable implement is inserted through the opening *i* in the door *f* and the heated charge pushed into the portion *s* of the chamber, the bottom of this portion being somewhat below the level of the bottom of the portion *t*. The partition *m* is then lowered, a fresh charge inserted into the portion *t* of the chamber E, and the partition raised, as before.

When the new charge has been properly heated the charge in the portion *s* of the chamber E will have been melted, and may, on removing the plug from the opening in the partition *a*, be run into the chamber F, where it is subjected to the action of the blast from the tuyeres for the purpose of being refined, the gases and impurities passing off from the chamber F through the pipe *w*. The opening in the partition *a* is again closed, the heated charge transferred from the portion *t* to the portion *s* of the chamber E, and a fresh charge introduced into said portion *t* of the chamber. The furnace D now contains three charges of iron, each undergoing a different treatment, the charge at one end of the chamber E being heated, the charge at the other end being melted, and the charge in the chamber F being refined by the action of the air-blast.

When the charge in the chamber F has been

properly refined a trough, M, is adjusted, as shown in Figs. 1 and 2, so that one end will communicate with the tapping-hole *n* of the chamber F and the other end with the charging-opening of the puddling-chamber. The plug is removed from the hole *n*, and the melted and refined metal run from the chamber F into the puddling-chamber, where it is worked in the usual manner, the tapping-hole *n* being then closed, the melted charge run from the chamber E into the chamber F, the heated charge in the chamber E moved therein, and a new charge inserted, and the operation being thus repeated continuously.

It will be observed that a charge of iron is being melted while the charge in the puddling-chamber is being worked, so that a much larger quantity of iron can be operated upon than in an ordinary puddling-furnace, in which the charge is introduced directly into the puddling-chamber and melted therein before being worked. Moreover, the refining of the iron by the air-blast before its introduction into the puddling-chamber enables me to obtain a product of a higher grade than ordinary puddled iron.

It is not essential to the main features of my invention that the furnace D should be partly horizontal and partly vertical, as it might be wholly horizontal or wholly vertical, and in some cases might be constructed for melting the iron only prior to its introduction into the puddling-furnace, the chamber F and blast-pipe in this case being dispensed with.

A permanent obstruction in the chimney B might also be substituted for the damper *e*, although the latter is preferred, as it may be opened to preserve the draft in case of accident to either of the pipes *b* and *d*, or to the furnace D.

I am aware that it has been proposed to build furnaces containing two or more chambers communicating with each other, with the view of melting, purifying, and puddling or otherwise treating the iron in one structure, heated throughout by the products of combustion from one fire-place, and I therefore do not claim, broadly, utilizing the same products of

combustion for both melting and puddling the iron, the aim of my invention being to attain this object in connection with an ordinary puddling-furnace, without necessitating any alteration in the construction or arrangement of the latter.

I claim as my invention—

1. The combination of the puddling-furnace A and the supplementary furnace structure D, adjacent to and independent of the furnace structure A, and inclosing a chamber, E, with the pipes *b* and *d*, whereby the waste products of combustion from the furnace A are caused to circulate through the said chamber E before escaping into the chimney or stack, all substantially as set forth.

2. The combination of the furnace A and the pipes *b* and *d* with the furnace structure D, adjacent to but independent of the furnace structure A, and inclosing two chambers, E and F, the two chambers communicating with each other, and the chamber F being provided with tuyeres, all substantially as specified.

3. The combination of the puddling-furnace A, having chimney B, the supplementary furnace D, having two chambers, E and F, separated by a partition, *a*, the pipes *b* and *d*, for causing a circulation of the products of combustion through said chamber E, and the tuyeres and blast-pipe communicating with said chamber F, as specified.

4. The combination of the furnace A, having chimney B, the pipes *b* and *d*, and the supplementary furnace D, having a chamber, E, with movable partition *m* and door *f*.

5. The combination of the furnace A, having chimney B, the supplementary furnace D, the pipes *b* and *d*, and the damper *e*, located in the chimney between the mouths of said pipes *b* and *d*, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN DEWITT WILLIAMS.

Witnesses:

J. M. FLEMING,
SIMON DRUM.