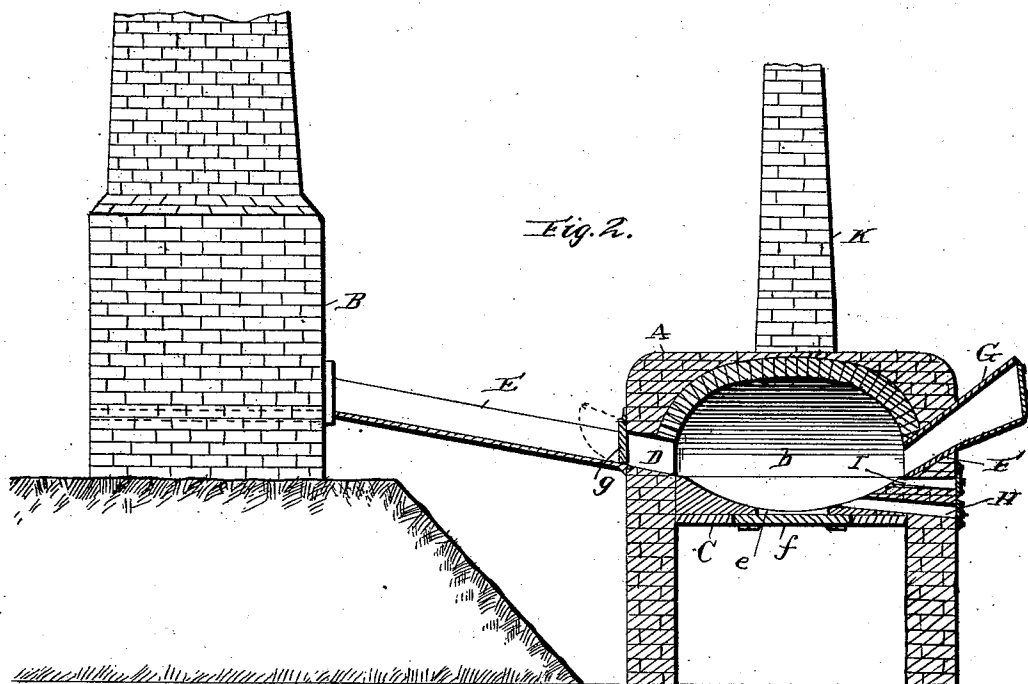
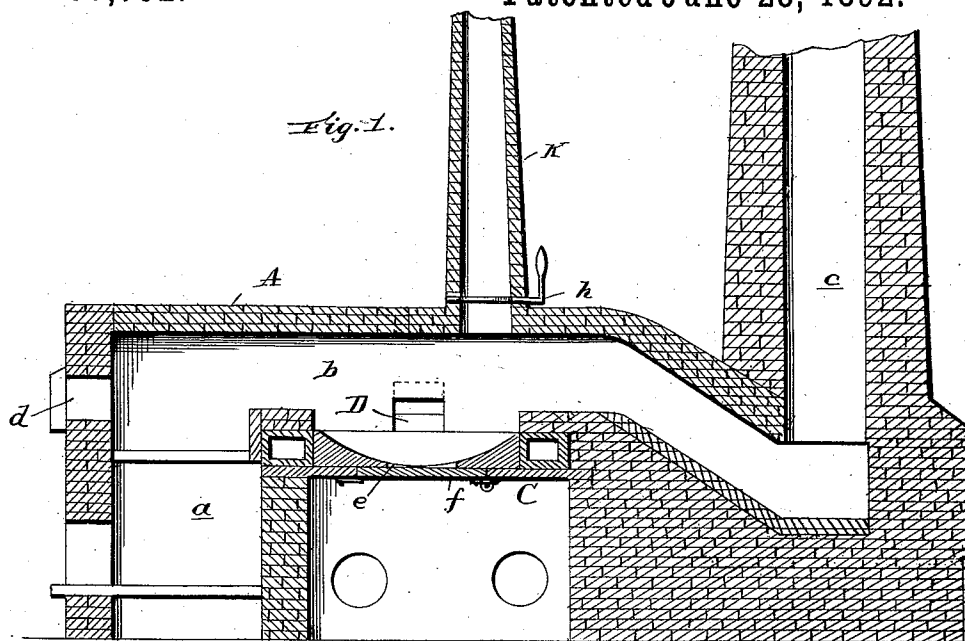


(No Model.)

W. A. BALDWIN.
FURNACE FOR ALLOYING METALS.

No. 477,792.

Patented June 28, 1892.



Witnesses:

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WILLIAM A. BALDWIN, OF NEW YORK, N. Y.

FURNACE FOR ALLOYING METALS.

SPECIFICATION forming part of Letters Patent No. 477,792, dated June 28, 1892.

Application filed February 13, 1891. Serial No. 381,333. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. BALDWIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Furnaces for Alloying Metals; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a furnace for alloying metals; and it has for its object to form an alloy by bringing molten iron, steel, or other metals to be alloyed in contact with the ore or other substance bearing such metals to be combined in the presence of a suitable reducing agent in an alloying-furnace.

The invention has for a further object to make such process continuous, so that the alloying of metals may be carried on extensively, and with this latter object in view I have provided a furnace in which the offensive fumes and other objectionable features heretofore experienced are obviated.

The invention will be fully understood from the following description and claim when taken in connection with the annexed drawings, in which—

Figure 1 is a vertical longitudinal sectional view of the alloying-furnace as constructed according to my improvements; and Fig. 2 is a cross-sectional view of such furnace, showing a cupola-furnace in connection therewith.

I shall first describe the construction of the alloying-furnace and then give a full description of the improved process as carried out by such furnace.

In the drawings, A indicates the alloying-furnace. This furnace is mainly of the general construction of a reverberatory-furnace, having a fire-chamber *a*, with an ash-box beneath, a flue *b*, and a stack or uptake *c* leading therefrom. A sight-aperture is provided in the front wall of the furnace, as shown at *d*.

C indicates the bottom of the alloying-furnace, into which the metals to be alloyed and also the reducing compound is brought, and this bottom has a central vertical aperture *e*, which is normally closed by a plate *f*, which may be hinged or otherwise secured in position beneath the said hole.

D indicates an opening in the side wall of the furnace for the introduction of the molten iron, steel, or other metal. This opening is provided with a gate *g*, which in practice should be lined with fire-clay or the like, and is designed to close said opening D after the molten metal has been drawn into the furnace.

E indicates a trough or conveyer, which is arranged on an incline or pitch toward the alloying-furnace A, and in the present illustration I have shown this conveyer as leading from a cupola-furnace B, although in some cases it may be connected with a Bessemer or other suitable form of converter; or, when desirable, the molten metal may be conducted to the alloying-furnace in a ladle.

At a point opposite the opening D and in the opposite side wall of the furnace is an aperture F, having on the outside a hopper G or other suitable means for receiving and conveying the ore or other substances bearing the metal to be alloyed and also the reducing agents. Both of these openings D and F are arranged at a point slightly above the bottom C, and are preferably a little inclined, as shown.

H indicates a hole leading from the bottom C of the furnace through one of the side walls thereof for drawing off the combined metals or alloy as it is formed, and I indicates a hole slightly above the draft-hole H for drawing off the slag from the furnace. This draft-hole is provided with doors, as is also the slag-hole for closing them, as shown.

Arranged in the roof of the flue *b*, and at a suitable point above that part of the furnace A in which the alloy is formed, is a stack or uptake K, which is designed to carry off the fumes and other offensive matter, in a manner as will be presently described. This flume or draft uptake may be of any suitable height and is provided with a damper *h*.

In carrying out my process for aluminizing metals or combining aluminum with any other metal I first start a slow fire in the alloying-furnace, the metal to be aluminized having been melted in the cupola-furnace. I then open the damper in the fume-uptake K, and also open the gate at the receiving aperture or hopper G, after which I fill in the reducing compound, together with the clay or substances bearing alumina. The reducing

agents which I preferably use for this purpose are set forth and claimed in my Letters Patent dated March 27, 1888, No. 380,161, and consists of sodium chloride and charcoal, the
5 clay or substance bearing alumina being ground or crushed and mixed with the reducing agents in the proportion of three parts of sodium chloride and one-fourth part of charcoal to one part of clay or other earth-bearing alumina. It is obvious that coke, coal,
10 or other carbonaceous substance may be used in the place of charcoal, and I also prefer to add thereto a suitable quantity of manganese, which should be also crushed and well mixed
15 with the other ingredients. I next open the draw of the cupola-furnace and the door *g* of the alloying-furnace *A*, when the molten metal is drawn in upon the compound and an immediate fusion of the whole takes place. I then
20 raise the heat in the alloying-furnace, so as to keep up a perfect fusion, when in about twenty minutes, more or less, according to the metal being treated, the alloy is ready to be drawn off.

25 When aluminizing steel, the alloying-furnace may be connected with a converter instead of a cupola-furnace.

When alloying nickel, copper, or other metals from their ores with steel or any other
30 metal to be alloyed, the reducing agents would be suited to the component elements of the ore, or substances containing such metals, clay, or other aluminous substances would not, of course, be used in this case, unless it
35 be desired to combine aluminum with the metals introduced.

When a large amount of carbon is required with steel, manganese or other carbonizing

substance is used; but when about one-half of one per cent. of carbon is left in the steel
40 taken from the converter or cupola it is not necessary to use the manganese.

I have found in practice that the fumes or chlorine formed by the sodium and the carbon united with oxygen is not only offensive
45 to the attendant, but they serve, when rising in great volumes, to impede the progress of the process to some extent, and for this reason I have provided the uptake or flue *K*, and I have arranged the damper therein so that
50 there may not be any unnecessary amount of heat lost or wasted after the gate at the filling-aperture *F* has been closed.

Having described my invention, what I claim, and desire to secure by Letters Patent,
55 is—

The improved alloying-furnace herein described, having the reverberating-flue *b*, with the stack *c* at the deepest portion thereof, the uptake *K* in the arch of said flue and above
60 the metal-receiving portion of the furnace, the damper *h* in the uptake and close to the base thereof, the molten-metal-receiving aperture *D* in one of the side walls, the incline aperture *F*, having the hopper *G* therein for
65 the introduction of ore and reducing agents, the drawing-off aperture *H*, and the aperture *I* for drawing off slag, all constructed and arranged substantially as specified.

In testimony whereof I affix my signature in
70 presence of two witnesses.

WILLIAM A. BALDWIN.

Witnesses:

CHARLES H. RAEDER,
THOMAS E. TURPIN.