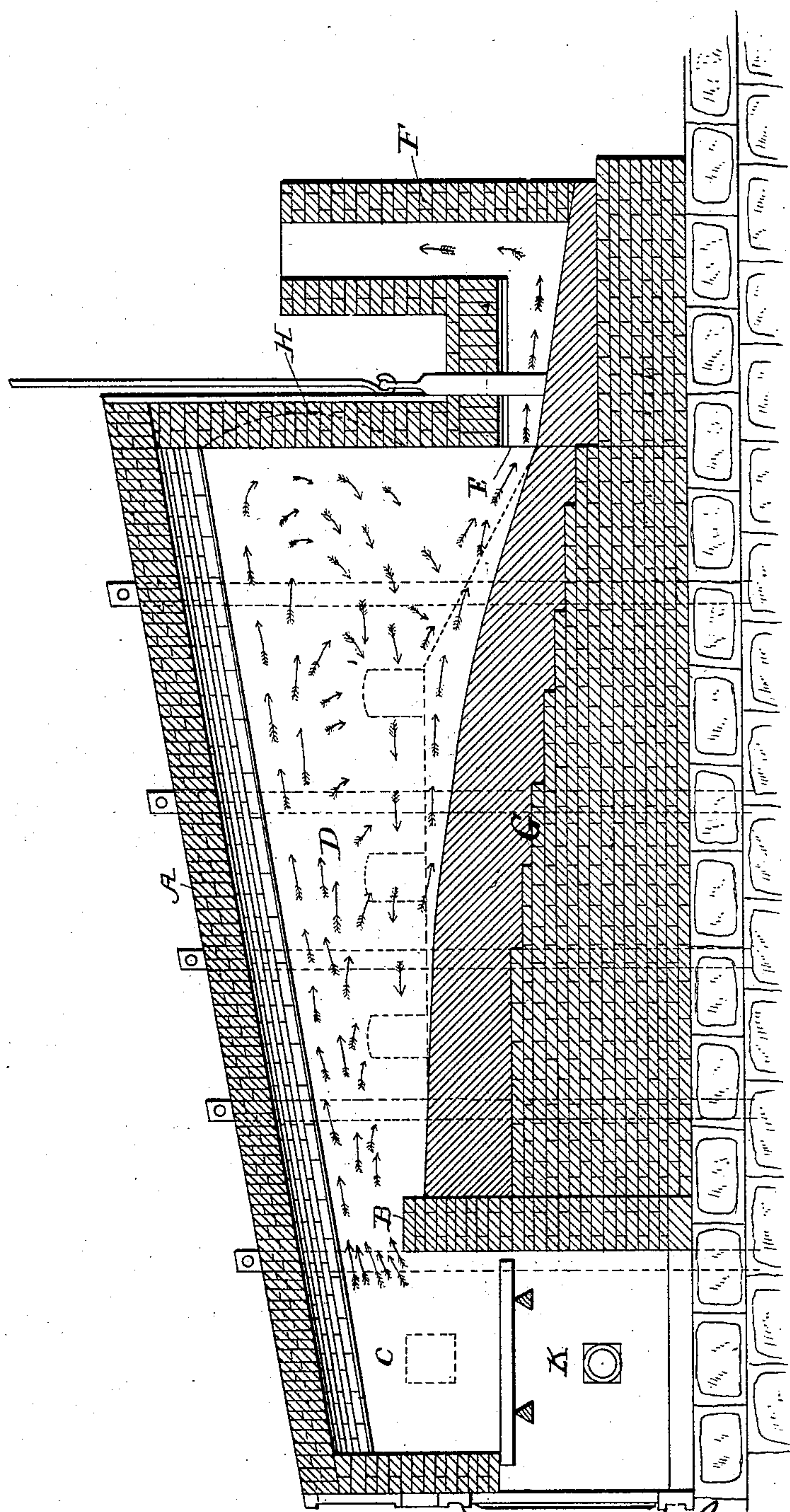


(No Model.)

J. N. LAUTH.  
FURNACE FOR METALLURGICAL PURPOSES.

No. 484,328.

Patented Oct. 11, 1892.



Witnesses  
Walter Farnariss  
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# UNITED STATES PATENT OFFICE.

JOHN N. LAUTH, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE LAUTH PATENT FURNACE COMPANY, OF SAME PLACE.

## FURNACE FOR METALLURGICAL PURPOSES.

SPECIFICATION forming part of Letters Patent No. 484,328, dated October 11, 1892.

Application filed December 10, 1891. Serial No. 414,647. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN N. LAUTH, a citizen of the United States, and a resident of St. Louis, in the State of Missouri, have invented  
5 new and useful Improvements in Furnaces for Metallurgical Operations; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawing, and to  
10 the letters of reference marked thereon, which form a part of this specification.

My invention relates to certain new and useful improvements in metallurgical furnaces for heating and puddling iron or steel.

15 The object of my invention is to provide a furnace which will be effective in operation and at the same time heat the billets, piles, slabs, ingots, or bars to the desired temperature with the smallest amount of fuel, and to  
20 this end I construct the melting or heating hearth of the furnace inclined downward toward the stack, as is usual in this class of furnaces, and the roof of said furnace inclined upward from the front of the fire-chamber to  
25 ward the neck or stack of the furnace, so that the products of combustion will strike against the wall above the outlet of the furnace and be reverberated or directed back onto the metal to be heated or melted on the hearth,  
30 while at the same time the carbonic-acid gas, together with the slag, is allowed to pass to the bottom of the stack. Heretofore in the construction of furnaces of this class it has been the prevailing method to provide a roof  
35 or arch over the melting-chamber inclining downward to the stack end of the furnace, and by this construction of roof the drawing off of the products of combustion before the same are thoroughly united with air and deprived of their heat is practically the result  
40 accomplished, so that the percentage of heat actually utilized is but a small portion of that which goes up the stack. This is due, mainly, to the fact that the flame coming from the  
45 fire-chamber is so dense as to be only partially combusted by reason of not being permitted to be thoroughly intermixed with air, which, even though injected into the fire-chamber, is in a great measure carried along in the dense  
50 flame without being taken up or united before entering the stack. As the main essen-

tial to the perfect combustion of fuel is thorough intermingling of the oxygen of the air therewith, it has been my purpose to provide not only for the expansion of the flame, where-  
55 by it will take up a greater percentage of air, but for the confining and retention of the flame and its attendant gases within the melting-chamber, so that time, which is essential for this thorough mixing with the air, may be  
60 given and the gases combusted before entering the stack.

My invention consists in constructing a furnace for metallurgical operations with a fire-chamber, hearth, and interposed bridge-wall  
65 of usual or suitable construction and with a rear deflecting-wall, an exit to the stack below the deflecting-wall, and a roof inclined upward from the front wall of the fire-chamber to the rear deflecting-wall, substantially as  
70 hereinafter described, whereby the gases of combustion and partially-commingled air are carried freely over the bridge and through a combustion-chamber of constantly-increasing  
75 area to the rear of the furnace, and by contact with the rear deflecting-wall are returned and more thoroughly commingled and the inflammable gases consumed before passing to the stack.

In the accompanying drawing I have illustrated the invention as applied to a heating-furnace for purposes of heating and welding metal. In all respects other than the inclination of the roof A the furnace does not differ,  
80 essentially, from other well-known forms of this type, it being usual to have the bridge B to partially divide the fire-chamber C from the melting-chamber D, and also to locate the neck E, forming the entrance into the stack F, at the sloping end of the hearth G.  
90

At the stack end of the furnace a wall H is formed instead of the usual arch, which, instead of choking the flame and facilitating its withdrawal from the chamber D, presents a barrier for deflecting back the expended flame  
95 and gases, which are further combusted by meeting the heated flame coming directly over the bridge-wall from the fire-chamber. It is obvious that the wall H may be concaved if found convenient, as illustrated by the dotted  
100 lines, as by that means the deflecting action of the same may be better accomplished.



By inclining the arch or roof, as shown and described, so that the flame will strike the rear wall and be deflected back onto the metal to be heated, a complete combustion is effected 5 and a saving of at least twenty-five per cent. of the fuel. The flame produced by the reverberatory action is a non-oxidizing flame, thus saving in the waste of metal from one-half to three per cent. over the old method of 10 heating.

The action of the furnace briefly described is as follows: The air-blast K, located under the grate of the fire-chamber, ejects air into the burning fuel to make the combustion as 15 rapid as possible, as is usual where this device is employed; but the flame which comes over the bridge dividing the fire-chamber from the melting or heating chamber is of such density that much of the air is carried along 20 without being intimately mixed. By the gradually-increasing size of the melting-chamber the flame is allowed to increase its volume, thereby uniting with the air more completely, and at the same time being carried along to 25 the stack end of the furnace, as indicated by the arrows near the roof, where it is deflected back by the wall H. The return gases, having had more space for expansion and more time for mixing with the air, are met by the 30 flame direct from the fire-chamber and combusted. The carbonic-acid gas which is generated, and which is necessarily a present element, is carried off first by virtue of its density, thus leaving the flame and gases, which are

deflected back on the articles to be melted of a 35 non-oxidizing nature. The action, therefore, of the flame and gases is such as to be very thoroughly utilized in the melting-chamber before being taken up the stack, it being understood that the expansion of the flame and 40 gases, as well as the time they are retained within the furnace, acts to make them more readily combustible before they leave the melting-chamber.

Having thus described my invention, what 45 I claim, and desire to secure by Letters Patent, is—

A furnace for metallurgical operations constructed, as herein described, with a fire-chamber, a hearth for the metal, a bridge-wall in- 50 terposed between the fire-chamber and the hearth, a deflecting-wall at the rear, an exit to the stack below the rear deflecting-wall, and a roof inclined upward from the front wall of the fire-chamber to the rear deflecting-wall, 55 whereby the gases of combustion are carried freely over the bridge and through a combustion-chamber of constantly-increasing area to the rear of the furnace and by contact with the rear deflecting-wall are returned and more 60 thoroughly mingled with the air and consumed before passing to the stack, as explained.

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

JOHN N. LAUTH.

Witnesses:

WM. ANDRÉ,

VALENTINE WEITZ.