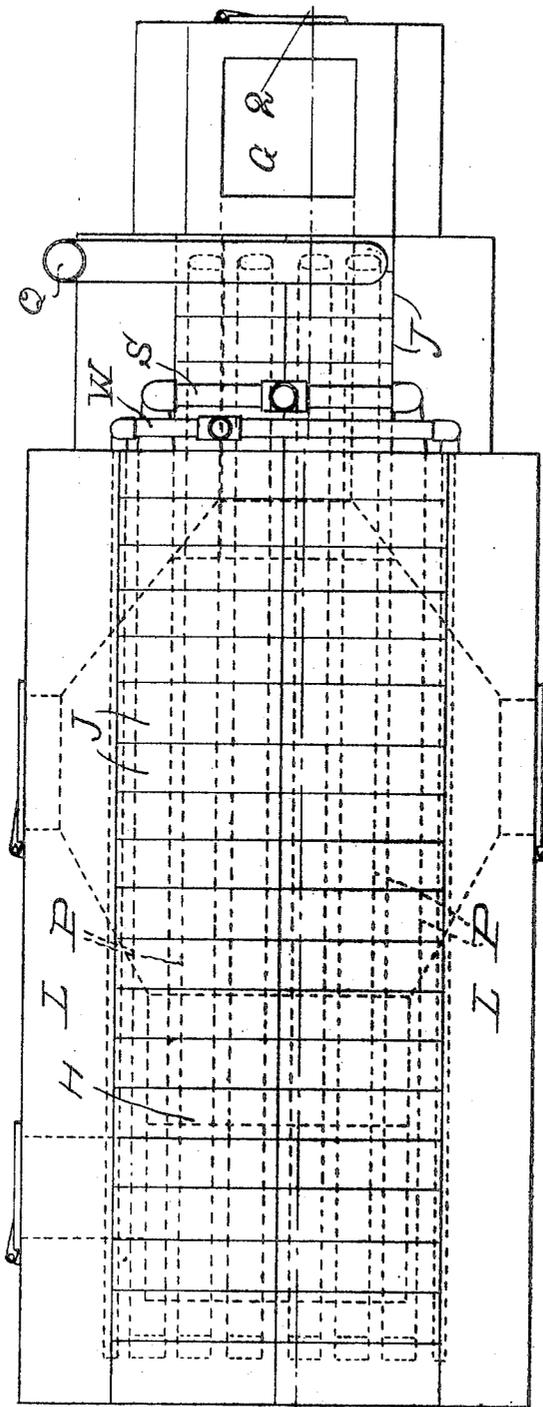


E. P. STEVENS.
FURNACE.

APPLICATION FILED SEPT. 6, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



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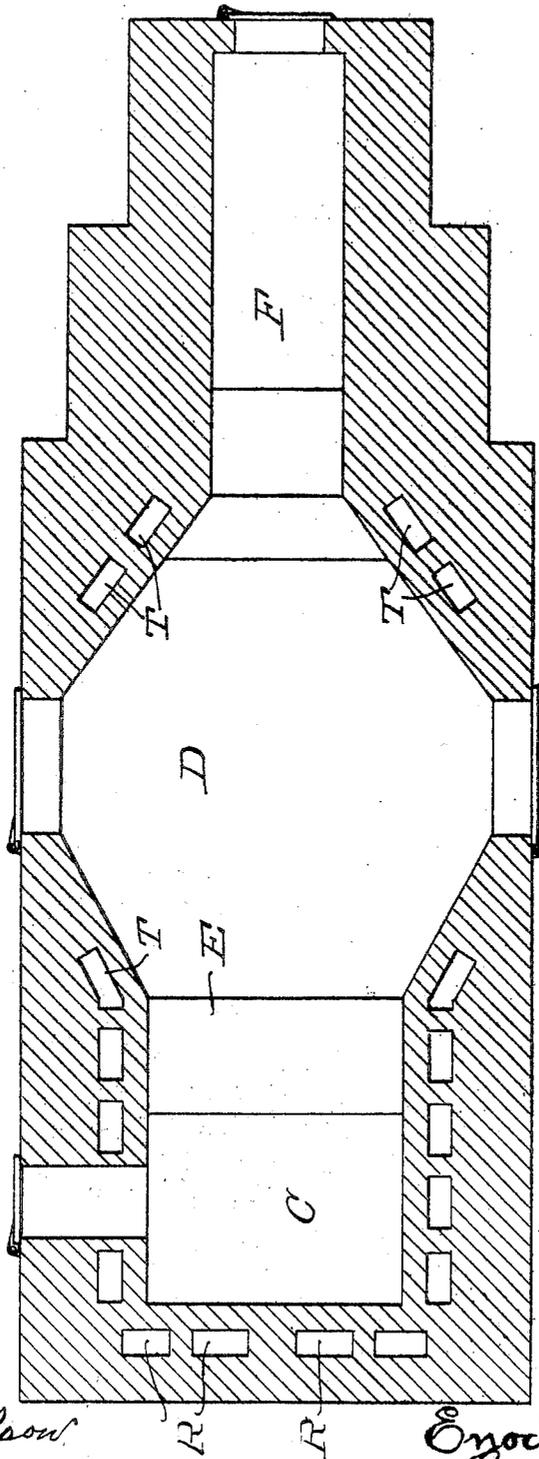
PATENTED AUG. 22, 1905.

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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

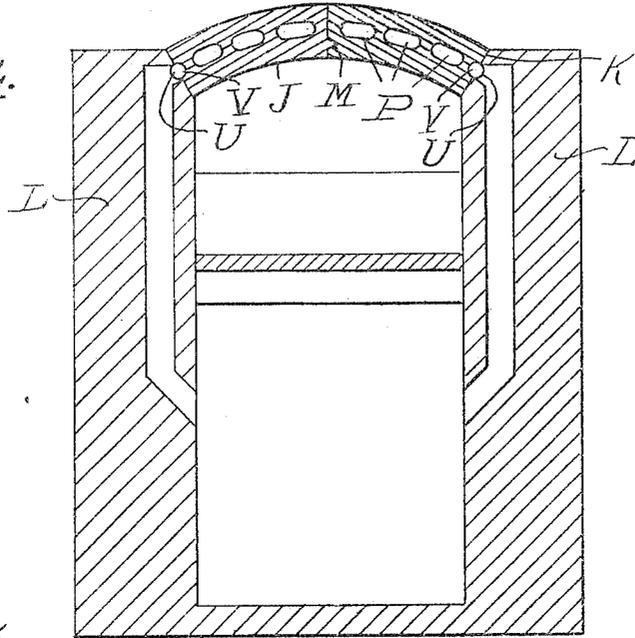


Fig. 5.

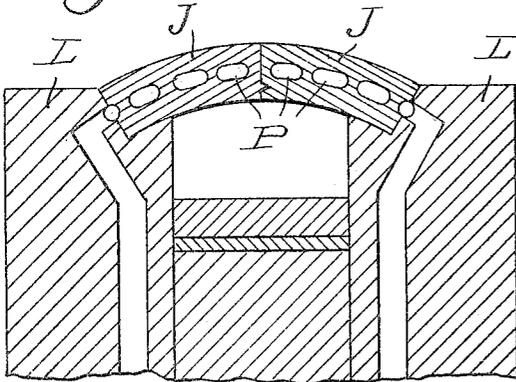
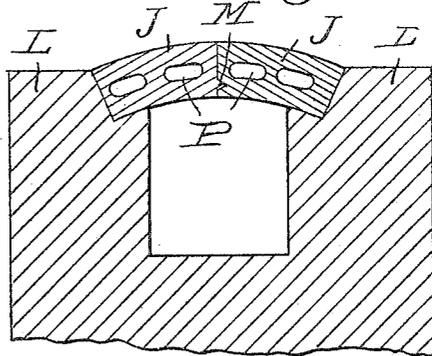


Fig. 6.



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UNITED STATES PATENT OFFICE.

ENOCH P. STEVENS, OF CHICAGO, ILLINOIS.

FURNACE.

No. 797,626.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed September 6, 1904. Serial No. 223,532.

To all whom it may concern:

Be it known that I, ENOCH P. STEVENS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces; and I do hereby 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.

My invention relates to a novel construction in a furnace, and more particularly to a furnace of the kind used for the manufacture of iron and steel, such as puddling-furnaces, the object being to provide a furnace in which the roof and side walls are so cooled by air as to cause them to last longer and in which the air used to cool said roof and side walls is fed to the fire in a superheated condition; and it consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a top plan view of a furnace constructed in accordance with my invention. Fig. 2 is a central vertical longitudinal section of same on the line 2 2 of Fig. 1. Fig. 3 is a plan section of same on the line 3 3 of Fig. 2. Figs. 4, 5, and 6 are vertical transverse sections on the lines 4 4, 5 5, and 6 6, respectively, of Fig. 2.

To these and other ends my said furnace comprises the ash-pit A, grate B, firing-chamber C, and puddling-chamber D, in which the molten metal is contained. A bridge-wall E is interposed between the firing-chamber C and puddling-chamber D, and from the rear end of the latter a downwardly-inclined laterally-contracted flue F leads to the chimney G.

In its general shape and construction my furnace coincides with those in general use, the novel features residing entirely in the specific construction of roof and side walls, as will be hereinafter more fully described.

The roof or crown H of the furnace covers the firing-chambers C, puddling-chamber D, and flue F and usually consists of an arch of fire-brick which rests upon the side walls. The said roof is subjected to intense heat, particularly above the firing-chamber, and consequently breaks down very quickly at this point, thus rendering it necessary to entirely rebuild this portion of said roof or crown at very frequent intervals. Such rebuilding is not only very expensive in itself, but necessitates complete shutting down of the furnace

for some time, so that any means for causing the life of such roof or arch to be increased will effect great economy in the cost of production of steel and iron. The side walls, while also subjected to intense heat, last a great deal longer than the roof or crown, but also require relining with fire-brick at frequent intervals. The said roof or crown is generally built of brick of ordinary size cemented together by means of fire-clay cement, such arches being usually concavo-convex. My invention comprehends the substitution for said small fire-brick of tiles J of such width that two of same will span the fire-chamber, &c., and abutting against each other at their ends above the middle of said fire-chamber, puddling-chamber, and flue. The said blocks or tiles J may be made in the form of segments of a hollow cylinder, as shown, or of any other convenient form, the outer ends of same being inclined and resting upon and abutting against the inclined or beveled upper ends K of the side walls L, while the inner ends of same are provided with interfitting tongues and grooves, as shown at M, which serve to hold said blocks or tiles in proper relative position and also to make a tight joint between said tiles. The said blocks or tiles J are provided on their front and rear faces with recesses N and projections O, each of said projections being adapted to fit the recess of the next adjacent tile, said tiles being thus supported partially upon each other and the joints between the same being thus made tight. Each of said tiles or blocks J is provided with a plurality of longitudinally-disposed parallel openings P, which are adapted to register to form continuous longitudinal air-flues in the roof or crown of the furnace, said flues being connected adjacent the chimney with a source of supply of air, as at Q, and said flues being connected at their other ends with vertical flues R in the end wall of the furnace, said flues R discharging into the firing-chamber. The said roof or crown is wider above the firing and puddling chambers than above the flue F, and therefore this portion of the roof contains more of said flues P, the additional flues being connected with a source of supply of air by means of the pipes S. In said side walls of the furnace I provide vertical air-flues T, which communicate at their upper ends with longitudinal grooves U in the beveled portions K of said side walls L and at their lower ends with the ash-pit A. The inclined ends of said tiles or blocks J are likewise pro-

vided with longitudinal grooves V, which register with said grooves U, and thus form cylindrical passages, which are connected with a source of supply of air by means of the pipes W. Air under pressure is preferably introduced into said flues to insure sufficient circulation therethrough to be effective. The air introduced enters said flues at the coolest portion of the furnace and passes gradually to the hottest portion and during its passage absorbs heat, so that when discharged into the ash-pit and fire-chamber it is practically superheated. The introduction of such hot air to promote combustion is very advantageous as compared with the introduction of cool air, the latter obviously acting to absorb considerably more heat from the fire than the superheated air. The latter absorbs heat from the tiles or blocks J, thus maintaining the temperature of the latter sufficiently low to prevent them from burning out very rapidly. In order to cause the air admitted to the firing-chamber to be thoroughly commingled with the hot gases, I so construct the bridge-wall that the front wall of same is inclined and overhangs the grate, thus causing same to restrain to some extent the passage of the hot gases into the heating-chamber. The combustible gases are thus effectively burned.

I claim as my invention—

1. A furnace comprising an ash-pit and a firing-chamber at one end, a puddling-chamber between its ends and a contracted flue at its opposite end communicating with the chimney, the roof of said firing-chamber, puddling-chamber and flue being provided with con-

tinuous air-flues formed in the body thereof and communicating at their flue ends with a source of supply of air and at their other ends with said firing-chamber, there being vertical flues in the side walls of said firing-chamber communicating at their upper ends with some of said flues in said roof and at their lower ends with the ash-pit, the front wall of said firing-chamber being provided with an opening above the grate forming an auxiliary air-inlet.

2. A furnace comprising an ash-pit and a firing-chamber at one end, a puddling-chamber between its ends and a contracted flue at its opposite end communicating with the chimney, the roof of said firing-chamber, puddling-chamber and flue being provided with continuous air-flues formed in the body thereof and communicating at their flue ends with a source of supply of air and at their other ends with vertical flues in the front wall of said firing-chamber and in the side walls thereof, said flues in the front wall communicating with the firing-chamber and said flues in said side walls communicating with the ash-pit, there being an auxiliary air-inlet in the said front wall of said firing-chamber above the grate and below the point of discharge of said vertical flues therein.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

ENOCH P. STEVENS.

Witnesses:

RUDOLPH WM. LOTZ,
R. M. COMBS.