

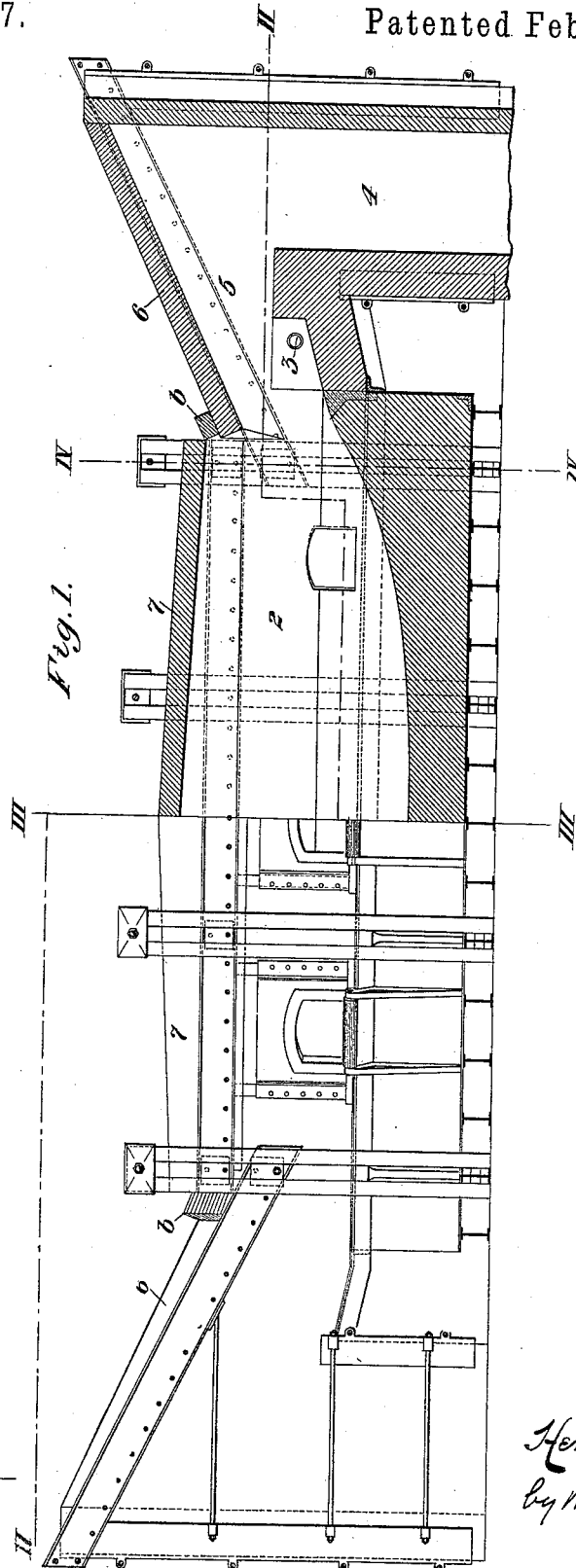
(No Model.)

3 Sheets—Sheet 1.

H. AIKEN.
FURNACE ROOF.

No. 420,487.

Patented Feb. 4, 1890.



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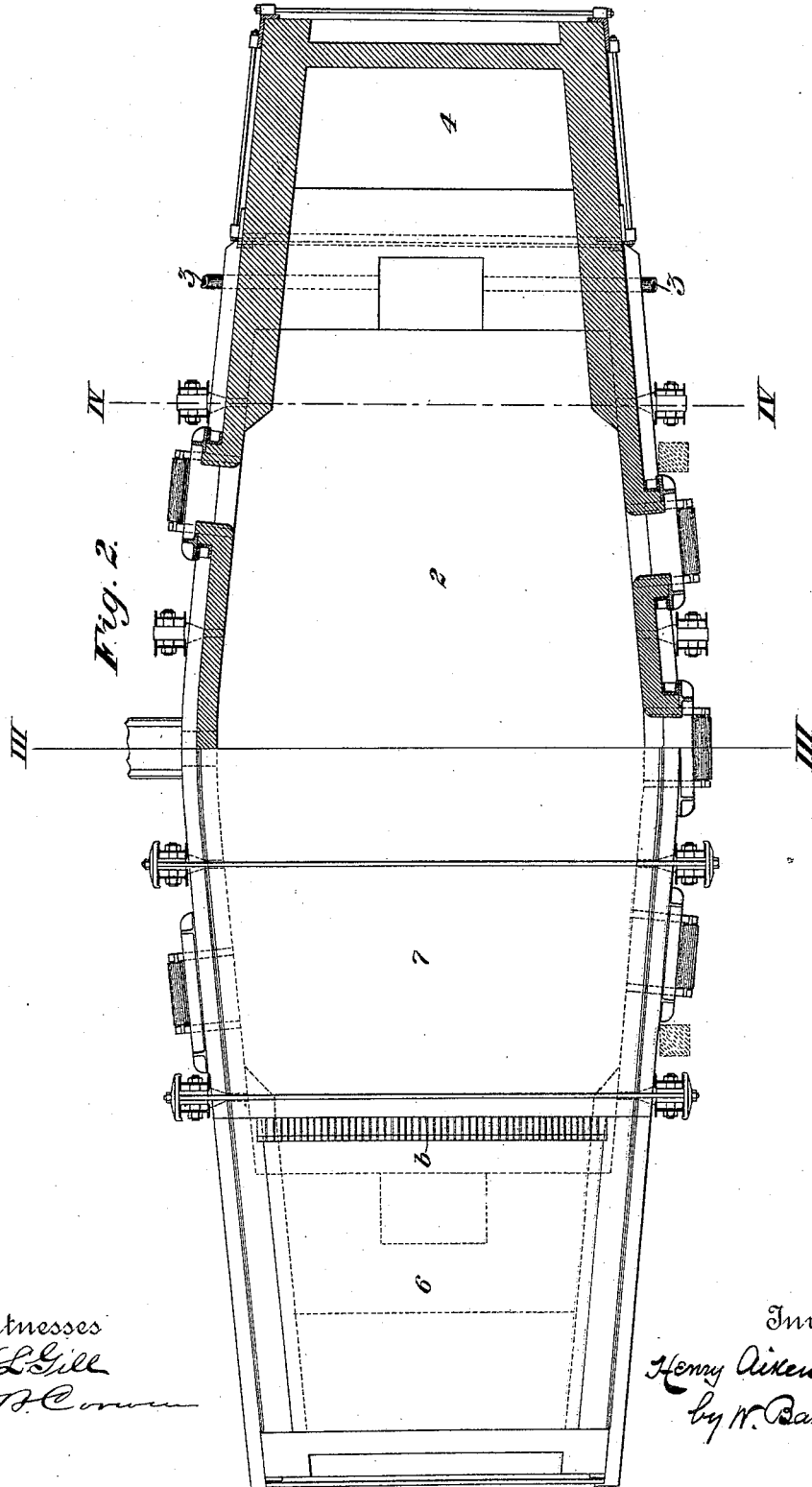
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3 Sheets—Sheet 2.

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(No Model.)

3 Sheets—Sheet 3.

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Fig. 3.

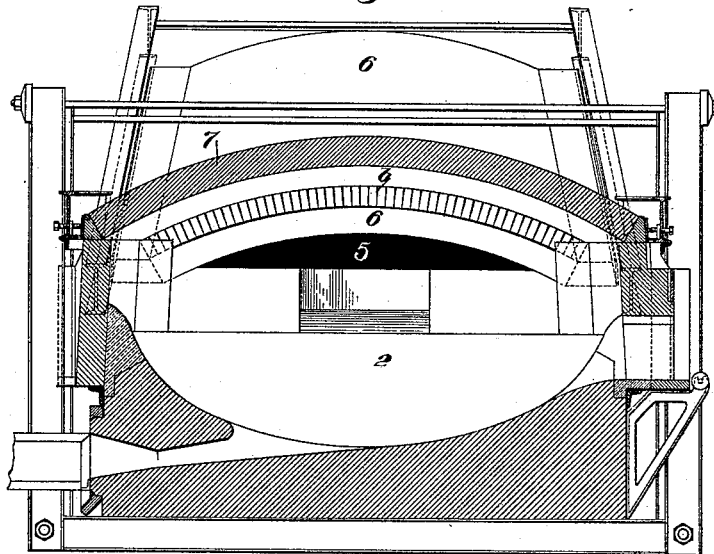


Fig. 3^a.

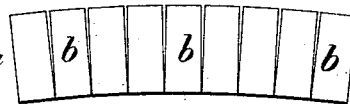
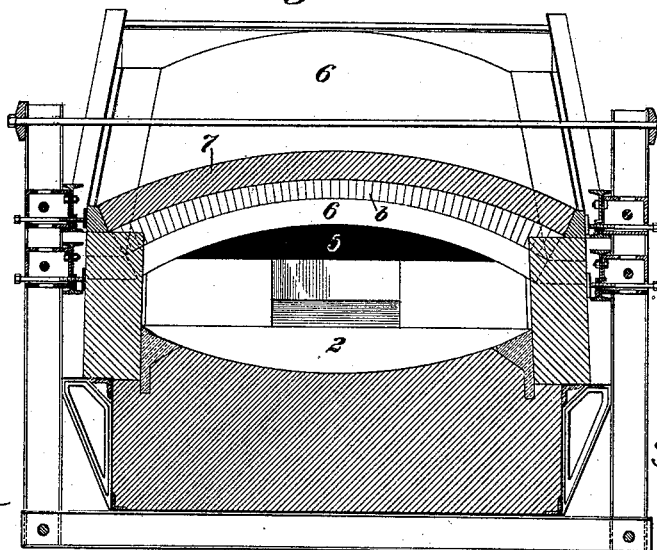


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF HOMESTEAD, PENNSYLVANIA.

FURNACE-ROOF.

SPECIFICATION forming part of Letters Patent No. 420,487, dated February 4, 1890.

Application filed April 11, 1889. Serial No. 306,778. (No model.)

To all whom it may concern:

Be it known that I, HENRY AIKEN, of Homestead, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnace-Roofs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a furnace provided with my improved roof, half of the furnace being shown in vertical central section. Fig. 2 is a horizontal section on the line II II of Fig. 1. Fig. 3 is a vertical cross-section on the line III III of Fig. 1. Fig. 3^a is an enlarged detail view showing some of the series of bricks *b*. Fig. 4 is a vertical cross-section on the line IV IV of Fig. 1.

Like symbols of reference indicate like parts in each.

The furnace illustrated in the accompanying drawings is an open-hearth furnace for melting steel; but the invention which I am about to describe is not limited specifically to such furnace, being applicable generally to furnaces of various styles, such as heating-furnaces, puddling-furnaces, and the like. In the working-chambers of such furnaces the hottest portion, where there is the greatest combustion, is at a point usually about one-third the distance of the combustion-chamber from the remote end of the hearth, and at this place the intense heat of the burning gases so attacks and injures the structure of the roof that the average duration of the roof in open-hearth furnaces is only about from one to three months.

It is the object of my invention to correct this evil and to provide means for protecting the furnace-roof.

Referring to the drawings, 2 represents the hearth or working-chamber of the furnace, which in the case illustrated is a reversing regenerator-furnace using gaseous fuel.

3 is the gas-supply pipe.

4 is one of the vertical flues leading from the regenerator and adapted to serve alternately as a stack-flue and an air-supply flue, and 5 is the neck-flue leading from the flue 4 into the working-chamber. Ordinarily the arch 6 of the neck-flue has been simply a con-

tinuation of the arch 7 of the working-chamber; but in my improved construction these arches are disjointed or stepped, so that the end of the arch 7 is elevated somewhat above the adjacent end of the arch 6—say, for example, about eighteen inches—and preferably inclined upwardly therefrom toward the middle of the furnace. The consequence of this construction is that the burning gases, impinging upon the end of the arch 6, do not come into direct contact with the inner arch 7 until they have traveled some distance beyond the point of greatest combustion, and when the gases do come into contact with the roof they have been diffused and have spent their heat sufficiently to prevent the rapid destruction of the masonry above described.

My invention is not limited in this regard strictly to producing the step in the roof by the construction which I have shown, since it may be modified in form and construction in various ways, such as will suggest themselves to those skilled in the art of furnace-building.

The second feature of my invention, which may very advantageously be used in combination with the one just described, consists in providing at the roof of the furnace an inlet or inlets of air, which, entering the furnace, forms an atmospheric cushion or mantle between the roof and the current of flaming gases, and thereby shields and protects the arch against the cutting action of the latter. In addition to this effect, the incoming air tends to deflect the flaming gases downwardly upon the furnace hearth or bed, and thus materially increases the heat of the hearth and reduces the time taken in refining or heating the metal. The preferable construction of the furnace in regard to this feature of my invention is illustrated in the several figures of the drawings. The vertical space between the adjacent ends of the arches 6 and 7 serves as the inlet for the air; but to prevent the too rapid admission thereof I employ bricks *b*, set loosely in position at this space, so as to afford intermediate air-crevices. The bricks thus serve the function of valves to regulate and distribute the ingoing air, and may be replaced by various other mechanical contrivances to perform the same results in substantially the same way. By combining the

stepped roof with the air-inlets in the manner shown in the drawings I obtain a useful conjoined result, because the stepped or elevated part of the roof serves as a sort of protecting
5 recess or passage for the outer current of air.

The advantages of my improvement will be appreciated by those skilled in the art.

The invention has been reduced to practical use, and has resulted in very largely
10 lengthening the working life of the furnace-roof.

I claim as my invention—

1. In a furnace, the combination, with the combustion-chambers, of the arches 6 and 7,
15 the end of the arch 7 being elevated above the adjacent end of the other arch and inclining upwardly therefrom, substantially as and for the purposes described.

2. In a furnace, the combination, with the
20 combustion-chamber, of a stepped arch or

roof having an air-inlet at said step communicating freely with the external atmosphere for the admission of a protecting current of cold air, substantially as and for the purposes described.

3. In a furnace, the combination, with the combustion-chamber, of the arches 6 and 7, the end of the arch 7 being elevated above the adjacent end of the other arch, an air-inlet
25 between the ends of the arches, and spaced 30 bricks or blocks for the regulation of the entering air-current, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 4th day of April, A. D. 1889.

HENRY AIKEN.

Witnesses:

W. B. CORWIN,
THOMAS W. BAKEWELL.