(No Model.) 2 Sheets—Sheet 1.

E. G. HEWITT.

FURNACE.

No. 345,972. Patented July 20, 1886.

Fig. 1.

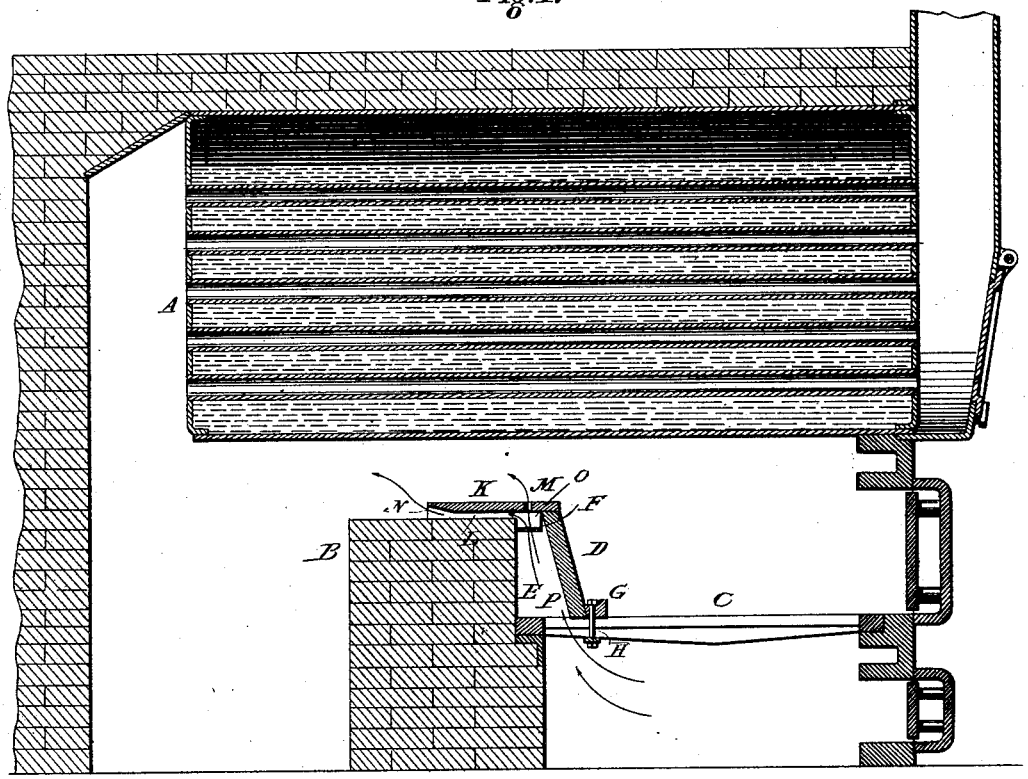


Fig. 2.

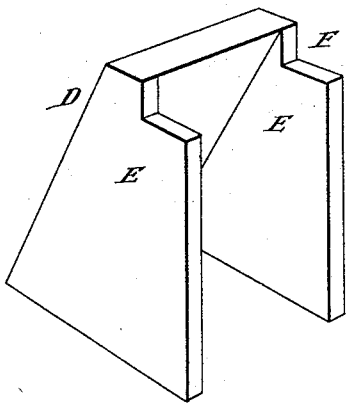
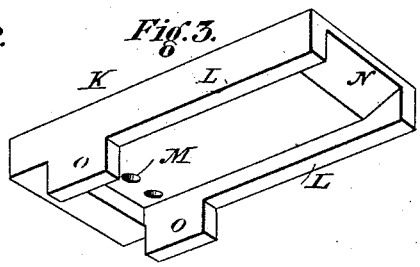


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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FURNACE.

No. 345,972. Patented July 20, 1886.

Fig. 4.

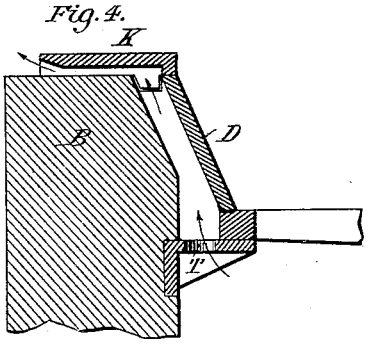


Fig. 5.

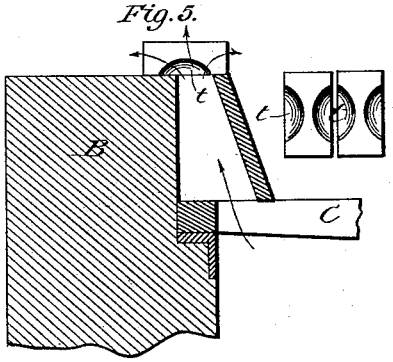


Fig. 6.

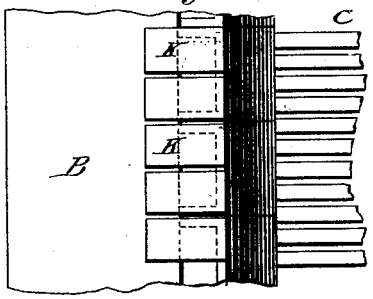


Fig. 7.

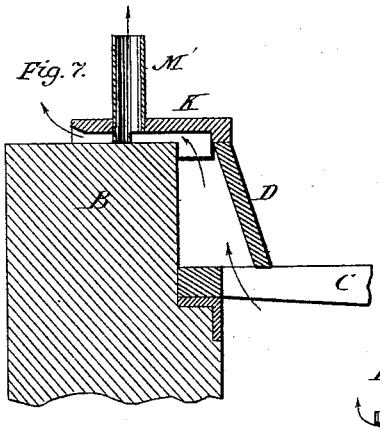
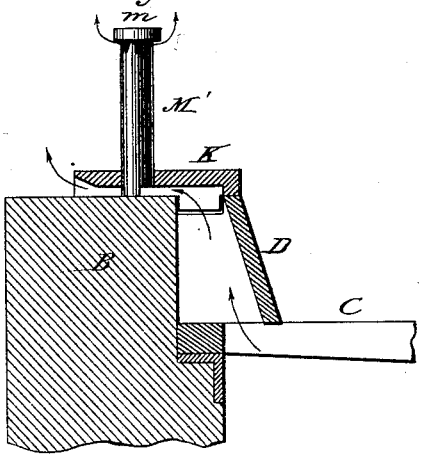


Fig. 8.



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FURNACE.

SPECIFICATION forming part of Letters Patent No. 345,972, dated July 20, 1886.

Application filed February 26, 1886. Serial No. 193,294. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. HEWITT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Furnaces, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

My invention is an improvement in devices for introducing hot air into the flame in a furnace above the fire with the object of effecting a more perfect combustion of the gases or other combustible matter, and developing a greater amount of effective heat from a given quantity of fuel.

The device which forms the subject of my present application is designed for use with furnaces in which a bridge-wall is used—that is to say, a partition or wall at the rear or sides of the furnace over which the flame and products of combustion pass on their way to the flue or to the boiler-tubes.

The improvement consists in what may be termed a "lining" or "facing," which is applied to this bridge-wall, the features of novelty which distinguish it being as follows:

First. The lining is made up of a number of blocks or sections of a refractory material, which, when placed on the grate-bars and against the bridge-wall, leave an air-space between the wall and the inner faces of the blocks.

Second. A number of plates of refractory material are laid upon the bridge-wall and the upper edges of the aforesaid blocks. These plates are perforated, and have also flanges which raise them from the bridge-wall, so that the air which comes up from below the grate-bars behind the sectional lining issues in part through the perforations, and the remainder from between the plates and the bridge-wall.

Third. The plates are beveled off at the ends that lie over the bridge-wall and on their under surface for the purpose of maintaining a free vent for the passage of the air, even should the perforations be clogged up and dust and dirt accumulate on the bridge-wall under the edges of the plates.

Fourth. The sections or blocks are held in position against the bridge-wall by an iron bar held to the grate-bars by bolts.

Fifth. The sections or blocks, the plates, and the iron bar above referred to have peculiar shapes which adapt them better to the special purposes to which they are applied and which will be more fully hereinafter set forth.

I now refer to the drawings for a detailed description of the invention.

Figure 1 is a central longitudinal section of a furnace and boiler to which my improvements are shown applied. Fig. 2 is an outline perspective view of one of the blocks or sections forming the lining. Fig. 3 is a similar view of one of the plates to be placed upon the bridge-wall. Fig. 4 is a cross-section of a portion of a furnace showing a modification of the invention. Fig. 5 is a similar view of another modification. Fig. 6 is a plan view of the same. Figs. 7 and 8 are other modifications, being portions of the furnace shown in section.

As any common form of furnace may be used, no specific description is necessary. In the present case, A is the boiler, B the bridge-wall, and C the grate, of an ordinary and well-known form of furnace.

The object is to introduce hot air into the flame above the grate-bars and fire in the most economical manner. To accomplish this, I mold a number of blocks, as D. I may make them of fire-clay or plumbago, or any material that will withstand a very high temperature without warping and cracking. I prefer for this purpose plumbago, such as is used in the manufacture of smelting-crucibles. These blocks have sides or flanges E, the rear edges of which are at right angles to the base. The upper portion of these flanges is cut away, as at F. I place a number of these upon the grate-bars and against the bridge-wall, forming a facing for said wall that preferably extends entirely across the interior space in the furnace, and to maintain them in position I secure along their lower edges a bar of iron, G, which may be held in position by bolts, as H. The front of this bar is made somewhat higher than the rest, in order to reduce the liability of the bolt-heads from burning off, and to form a stop for the bar or scraper introduced to rake or bank the fire. I also mold a number of plates, as K, for which I prefer to use ordinary fire-clay. These plates are made with flanges L L along their edges, and

on the under side, and near the forward end or that which extends into the furnace, a line of perforations, M, is formed. The opposite end is beveled off on the under side, as shown at N. These plates are laid upon the bridge-wall, and may be long enough to completely cover the top, if so desired; but this is not advisable. In order to hold them in position, they are provided with one or two lugs, O, which fit into the space between the top of the blocks D and the bridge-wall. The flanges in the said blocks are cut away in order to let these lugs down when they happen to be over a flange. With this arrangement the air is drawn up by the furnace-draft from below the grate through the passages P. In these it is heated to a high temperature, as the blocks D and the plates K are fully exposed to the intense heat of the fire. A portion of this heated air escapes through the perforations M into the flame. The remainder passes along under the plates K, and is still further heated, finally issuing from under the plates and into the flame, as indicated by the arrows. In order to provide against the stoppage of this supply of hot air in case the perforations M become filled up or there should be a considerable accumulation of dust under the edges of the plates K, the edges of the latter are beveled off, as shown.

I shall now describe some modified forms of the invention by reference to Figs. 4 to 8, inclusive.

In Fig. 4 is shown a bridge-wall, which is inclined. It often happens that bridge-walls of this shape are found in furnaces. In such cases the flanges of the blocks D are cut or shaped to conform to the shape of the bridge-wall. In this figure is also shown a feature which is within my invention. The grate-bars do not extend entirely up to the bridge-wall; but the same result is obtained by providing air-passages T from below the grate, as shown.

In Figs. 5 and 6 a modified form of the plates K is shown. They are in this instance ordinary fire-bricks laid with narrow spaces between them. Through the slots thus formed the heated air issues. To better accomplish this, the under sides of the bricks are cut away to a greater or less extent, as shown at *t*.

In Fig. 7 another modification of the plates K is shown. In lieu of or in addition to the simple perforations M, I use in this case tubes M', which are inserted in the perforations, and carry the air up farther into the flame.

In Fig. 8 a similar device is shown. The tubes are serrated around the top, and are provided with covers *m* to prevent dust from entering the tubes. These tubes have a certain advantage over a simple peforation in that the air is better mixed with the flame and is more highly heated.

These improvements combine many advantages not to be found in the numerous devices for a like purpose which have heretofore been devised. The device may be applied without change to nearly any furnace, and may be as readily removed for cleaning or repair. It produces a better distribution of the heated air and heats it more effectually.

What I claim is—

1. The combination, with the bridge-wall of a furnace, of a lining or facing applied thereto and composed of sections of refractory material laid upon the grate-bars and plates laid upon the bridge-wall and the top of the facing, and provided with or forming passages for the admission of air into the flame, as set forth.

2. The combination, with the bridge-wall of a furnace, of a lining or facing applied thereto and composed of flanged blocks or sections laid above the grate-bars and plates laid upon the bridge-wall and the edges of the blocks, and provided with or forming passages for the admission of air into the flame, as set forth.

3. The combination, with the bridge-wall of a furnace, of a refractory lining containing air-passages applied to the side of the bridge-wall, and a refractory covering laid upon the top of the bridge-wall and over the lining, and provided with passages for the escape of the heated air from the lining into the flame, all as set forth.

4. The combination, with the bridge-wall of a furnace, of a refractory lining laid upon the grate-bars and against the face of the bridge-wall, and provided with or forming air-passages, and a series of plates laid upon the bridge-wall and over the edge of the lining, and provided with passages for the escape of the heated air from the lining into the flame, as set forth.

5. The combination, with the bridge-wall of a furnace, of a refractory lining laid upon the grate-bars and against the face of the bridge-wall, and provided with or forming air-passages, and a series of flanged and perforated plates laid upon the bridge-wall and over the edge of the lining for permitting the escape of the heated air from the lining into the flame.

6. The combination, with the bridge-wall of a furnace, of a lining or facing composed of blocks of refractory material having flanges that form air-passages between the bridge-wall and the blocks, and a series of perforated and flanged plates laid upon the bridge-wall and the upper edges of the blocks, as set forth.

7. The combination, with the bridge-wall of a furnace, of a sectional refractory lining or facing laid upon the grate-bars and applied to the face of the bridge-wall, and containing or forming air-passages, and an iron bar secured to the grate-bars for holding the lining in position against the bridge-wall, as described.

8. The combination, with the bridge-wall of a furnace, of a refractory lining laid upon the grate-bars and against the face of the bridge-wall, and provided with or forming air-passages, a series of flanged and perforated plates laid upon the bridge-wall and over the edge of the lining, and an iron bar secured to the grate-bars along the lower edge of the lining for keeping the same in position.

9. The combination, with the bridge-wall of a furnace, of a refractory lining laid upon the grate-bars and against the face of the bridge-wall, and provided with or forming air-passages, a series of flanged and perforated plates laid upon the bridge-wall and over the edge of the lining, and an iron bar thicker along its front edge secured to the grate-bars along the lower edge of the lining for keeping the same in position and shielding it from injury, as herein set forth.

10. The combination, with the bridge-wall of a furnace, of a refractory lining laid upon the grate-bars and against the face of the bridge-wall, and a series of plates of refractory material containing perforations and provided with flanges along the edges and lugs near the forward ends, the said plates being laid upon the bridge-wall and over the edge of the lining, as and for the purpose set forth.

EDWD. G. HEWITT.

Witnesses:
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J. DANIEL COMPTON.