

(No Model.)

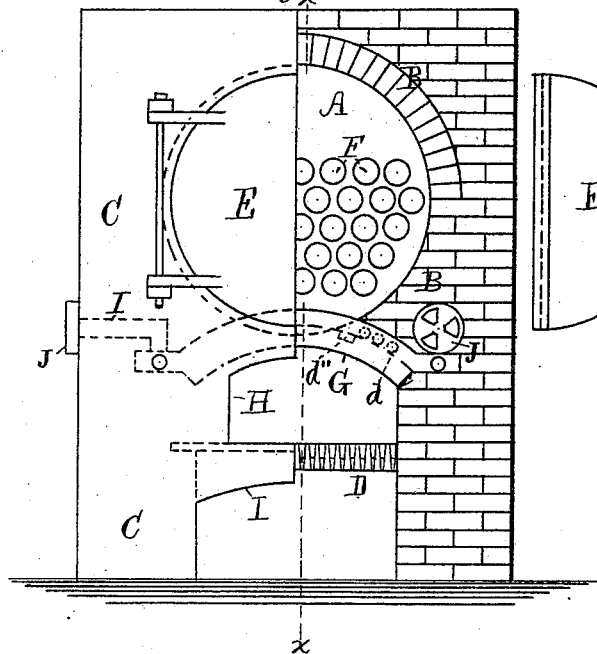
E. A. HAWES.

AIR SUPPLYING ARCH FOR FURNACES.

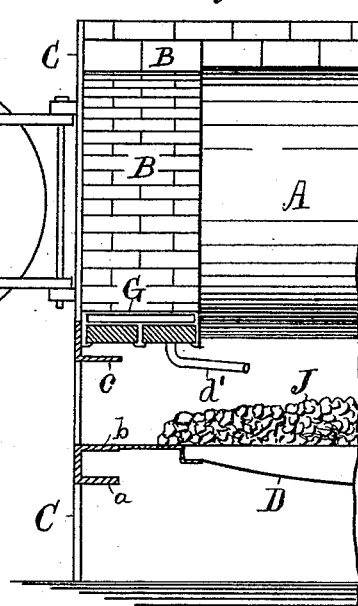
No. 304,725.

Patented Sept. 9, 1884.

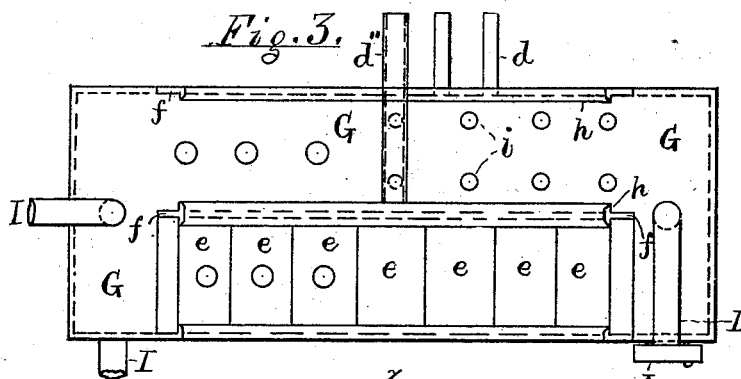
*Fig. 1.*



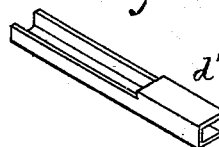
*Fig. 2.*



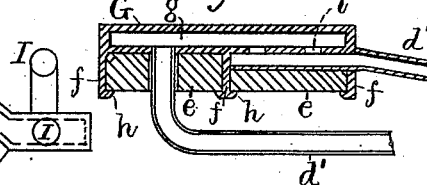
*Fig. 3.*



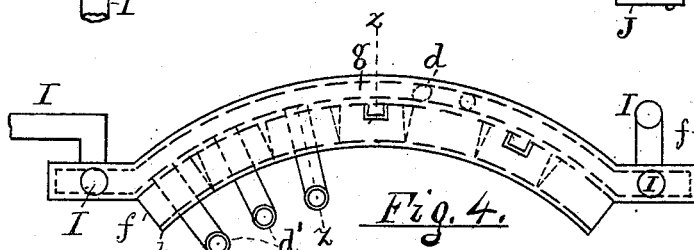
*Fig. 6.*



*Fig. 5.*



*Fig. 4.*



*Attest.*

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*H. C. Heberath.*

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*Edward A. Hawes*

*per Thos. S. Crane, Atty.*

# UNITED STATES PATENT OFFICE.

EDWARD A. HAWES, OF MONTCLAIR, NEW JERSEY.

## AIR-SUPPLYING ARCH FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 304,725, dated September 9, 1884.

Application filed December 17, 1883. (No model.)

### *To all whom it may concern:*

Be it known that I, EDWARD A. HAWES, a citizen of the United States, residing in Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Air-Supplying Arches for Furnaces, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention consists in an improved construction for a fire-front arch in boiler-furnaces, by means of which I preserve the arch from warping and disintegration by the violent heat to which it is exposed, and utilize the heat absorbed by the arch to elevate the temperature of the air fed to the fuel. My invention also affords an efficient means of mingling heated oxygen with the gases of combustion before the latter have cooled at all, and thereby preventing the formation of smoke and economizing the consumption of fuel.

In the drawings annexed, Figure 1 represents a boiler-setting having one-half of the cast-iron furnace front C broken away, to show my arch in its relation to the boiler and the furnace. Fig. 2 represents a vertical section of the same on line *x x* in Fig. 1, the boiler not being shown in section. Fig. 3 is a view of the under side of the fire-arch detached from the setting. Fig. 4 is an edge view of the same, and Fig. 5 is a section of the arch on line *z z* in Fig. 4. Fig. 6 is a perspective view of one of the air-chutes adapted for use in connection with openings in the under side of the arch.

A is the boiler; B, the brick-work sustained by the fire-arch; C, the iron furnace-front; D, the grates; E, the doors in the furnace-front for cleaning the tubes; F, the tubes; G, the fire-arch; H, the fire-door opening, and I the ash-door opening, the doors not being shown.

In Fig. 2 the front C will be seen to have flanges on its inner side, as at *a b c*, to strengthen the same around the fire and ash doors, and a similar flange has sometimes been used to sustain the brick-work embracing the end of the boiler, and which is shown at B in Fig. 1. My fire-arch G serves as such support, and practically forms the roof of the furnace at its front end, where the heat is very great, owing

to the proximity of the fuel, (shown at J in Fig. 2.) As the fire-arch unavoidably absorbs a great deal of heat, I utilize such heat, while reducing the temperature of the arch and promoting its durability, by making it hollow, passing a current of air through it, and conducting such heated air in jets into the furnace.

In Figs. 4 and 5, *g* represents the hollow inside the arch, the latter being cast with a core in the ordinary manner, and *d d' d''* represent three forms of jet-conductor for leading the heated air from the inside of the arch, the air being introduced by pipes I in any convenient manner. As the naked casting would be soon destroyed by the excessive heat, I protect the same by a lining of bricks, *e e*, applied in a special manner, as shown in Figs. 3, 4, and 5, and conduct the jet-pipes, in some cases, through or between the bricks, or cut out a channel in the latter. These various methods of construction are necessitated by the various relations the edge of the fire-arch may bear in practice to the particular boiler wherewith it may be used. Thus, in Fig. 1, a portion of the arch is shown in contact along the center of the latter with the lower corner of the boiler, and the insertion of jet-pipes in the edge of the arch at that point is therefore impossible, while farther from the center pipes may be inserted directly into the hollow *g* through the edge of the arch, as shown at *d* in Figs. 1, 3, and 4. At the center the jet-pipes may be inserted in the lower side of the arch and bent toward the fuel, if desired, as shown at *d'* in Figs. 2, 4, and 5, while at intermediate points, where the lower side of the arch coincides with the bottom of the boiler, I may use chutes or channels inserted between the brick facing and the lower side of the arch, as at *d''* in Figs. 1, 3, 4, and 5. The bricks are shown sustained upon the lower side of the arch G by longitudinal ribs or flanges *f*, the latter being shown as attached at the middle and edges of the arch-casting, and retaining the bricks *e* in place by hooks *h*, cast upon such ribs. The holes for the chutes *d''* are indicated in one of the ribs at the edge of the arch, at *n* in Fig. 4, and the chute is shown in section, penetrating the hole in the

rib, in the view in Fig. 5, holes *i* being formed in the under side of the arch to discharge the heated air into the chute, as shown in Figs 3 and 5. The bricks in such case are grooved lengthwise at the middle or edge to permit the passage of the chute, both methods being shown in Fig. 4.

The chute is shown entirely detached from the arch in Fig. 6, and is shown with a tubular nozzle and a trough-like body, so that the air may pour into it from the holes *i* and be guided effectively through the nozzle when it has passed outside of the arch.

I am fully aware that bridge-walls and other parts of furnaces have been provided with hollow castings and air-outlets, and do not, therefore, claim such construction alone. My invention consists in combining such means of heating the air and introducing it into the furnace above the fuel with a structure having another function—viz., the supporting of the front brick-work, (shown at B.) My construction, therefore, makes use of the metallic arch or plate required at such point to form a chamber, *g*, to contain the air and to admit it to the furnace in a very advantageous manner, the hollow form serving to increase the strength of the arch, while the brick facing secures its durability.

At I in Figs. 1 and 3 are shown the external connections provided with registers J, for regulating the flow of air into the chamber *g*, the registers being applied to the ends of such inlet-pipes I, where the latter project through the front or side of the boiler-setting, being accessible in either case to the fireman at the front of the boiler to regulate the supply of air to the condition of the fire. Such inlets I may be applied to either the top, side, bottom, or ends of the arch G, all of such

methods being shown in the drawings. When the bricks *e* are prepared for the reception of the jet-pipes and are inserted in the arch, they do not need to be disturbed in removing or repairing the latter, as both the pipes and chutes are passed through the bricks, where necessary, by openings adapted to release them without hinderance at any future time. The nozzles or jet-pipes may, if preferred, be cast fast to the hollow fire-arch; but in such a construction there is greater danger of their being broken and less facility for replacing them if burned out.

The flat pipes or chutes shown at *d''* are especially advantageous when the space between the top of the fire-door and the bottom of the boiler is very limited, as such edge connections to the arch do not project downward in the way of the fireman like the bent pipes *d'*.

Having thus set forth my invention, I claim as follows:

1. The combination, in a fire-arch, of the casting G, formed with chamber *g* and longitudinal ribs *f*, and the brick lining inserted between the longitudinal ribs, the inlet-pipes I, and the jet-pipes, all arranged to operate substantially as shown and described.

2. The combination, with the fire-arch constructed as herein shown and described, of the chutes *d''*, fitted through openings *n* in the flange *f*, and applied to the holes *i* in the lower side of the arch, all substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD A. HAWES.

Witnesses:

THOS. S. CRANE,  
C. C. HERRICK.