2 Sheets--Sheet 1.

C. GEARING.

Furnace-Attachments for Supplying Air to the Fire-Boxes.

No. 156,994. Patented Nov. 17, 1874.

Fig. 1.

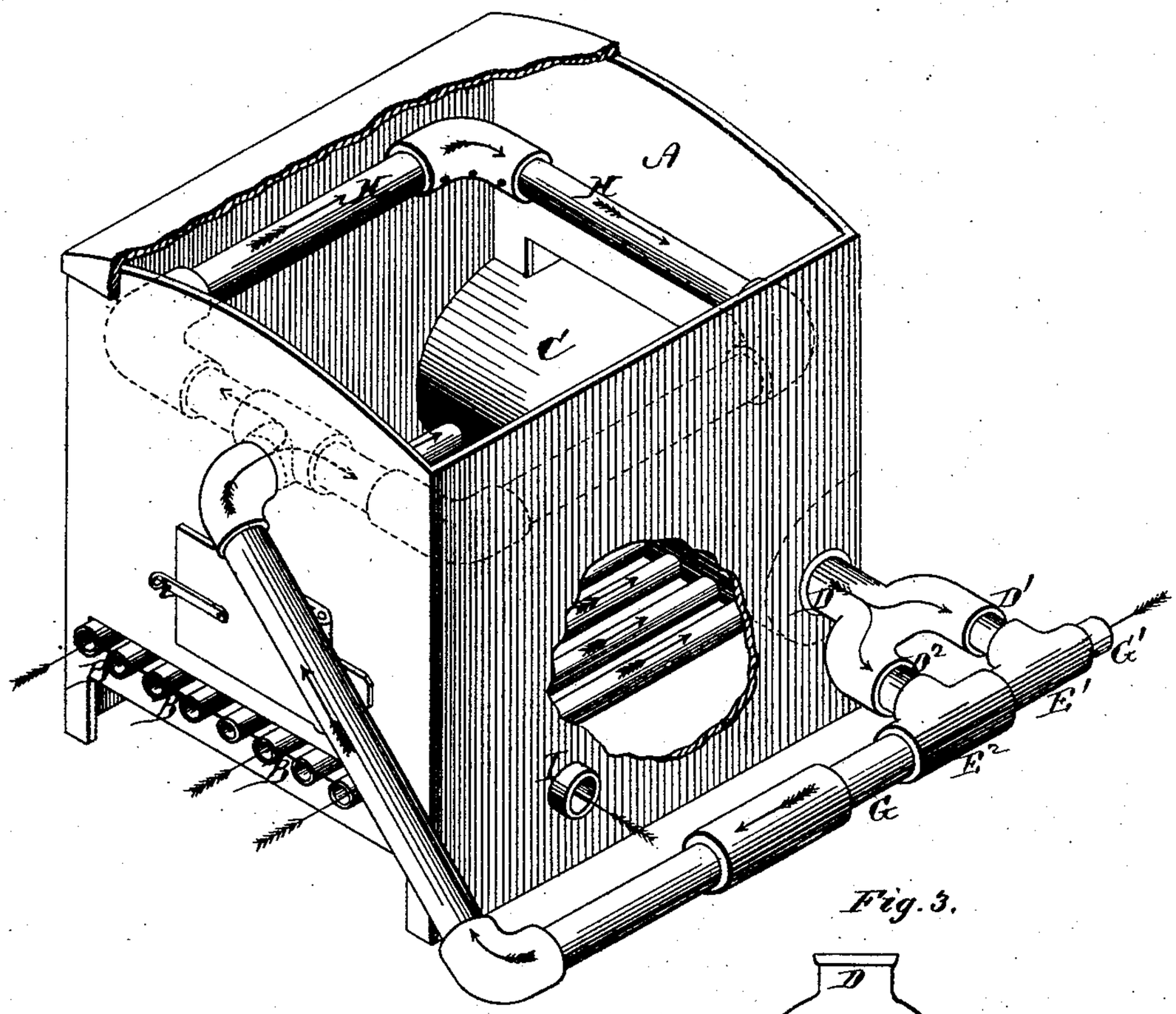
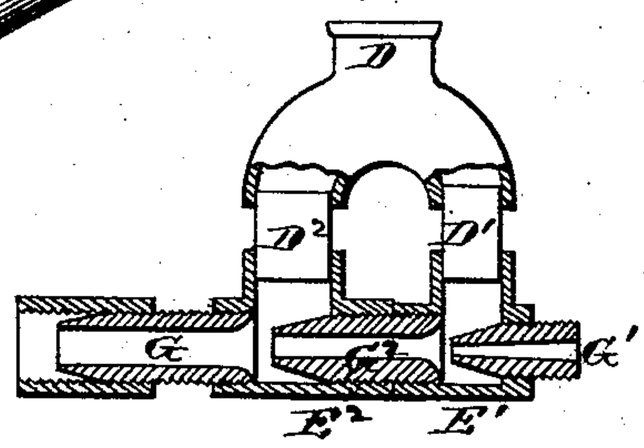


Fig. 3.



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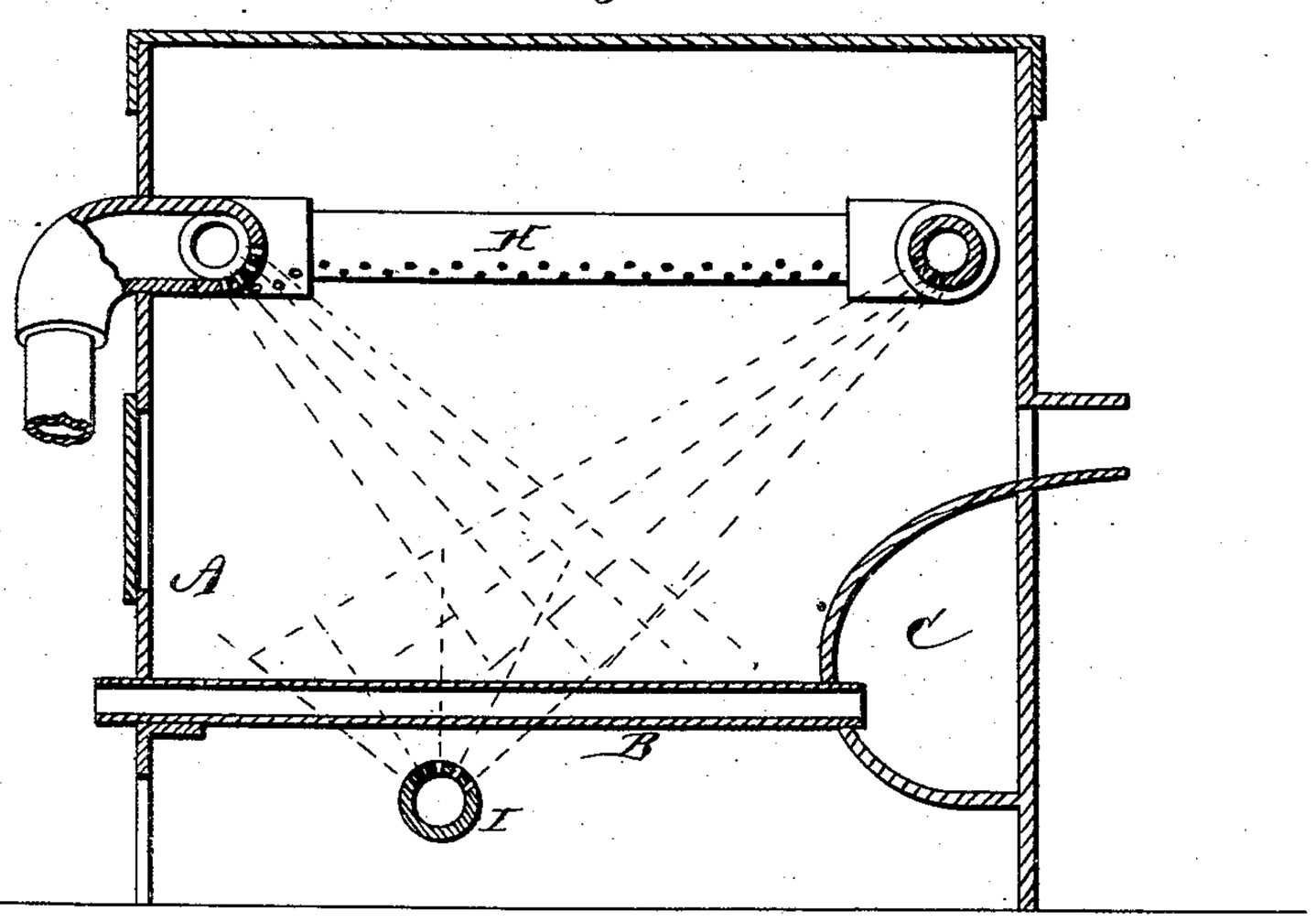
2 Sheets--Sheet 2.

C. GEARING.

Furnace-Attachments for Supplying Air to the Fire-Boxes.

No. 156,994. Patented Nov. 17, 1874.

Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES GEARING, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH HIS RIGHT TO ALEX. McBANE, WM. G. JOHNSTON, JARED M. BRUSH, JEROME B. AN JER, JNO. B. LIVINGSTON, AND E. WESTERVELT, OF SAME PLACE.

IMPROVEMENT IN FURNACE ATTACHMENTS FOR SUPPLYING AIR TO THE FIRE-BOX.

Specification forming part of Letters Patent No. **156,994**, dated November 17, 1874; application filed November 7, 1874.

To all whom it may concern:

Be it known that I, CHARLES GEARING, of Pittsburg, in the county of Allegheny and in the State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in a device for supplying air to furnaces for the purpose of preventing smoke, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a perspective view of a furnace with my invention attached thereto. Fig. 2 is a longitudinal section of the same; and Fig. 3 is a section of the branch pipe or injector used.

My invention is equally applicable for the use of hot or cold air, but in the drawing I have shown it arranged for the use of hot air.

A A represent the walls of a furnace, and B B are the grate-bars therein. These grate-bars are hollow, their front ends being open and extending through the front wall of the furnace. The rear ends of the grate-bars B open into a hollow bridge-wall, C, at the rear end of the furnace, as shown. In one end of the hollow bridge-wall C is inserted a short pipe, D, having two parallel branches, D^1 D^2, of unequal diameter, as shown in Fig. 3. These branches enter two ordinary T-joints, E^1 E^2, which are connected by being screwed on a nozzle, G^2. A smaller nozzle, G^1, enters the fitting E^1, and, said nozzle being connected with the boiler, the steam enters and passes through the nozzle G^1, so as to draw the hot air from the hollow bridge-wall C through the branch D^1 and into the nozzle G^2. As the air passes through this nozzle it draws more air from the hollow bridge-wall C through the branch D^2 into a third nozzle, G, inserted in the fitting E^2. The nozzle G is connected with one or more pipes, H, arranged within the furnace above the fire.

By having a double injector, as above described, only a small amount of steam is required to produce the required power for injecting air into the pipe or pipes H, and through them onto the fire. The steam, entering through the nozzle G^1, draws enough air through the branch D^1 to increase the power sufficiently to draw the necessary amount through the branch D^2 to supply the fire. The pipe or pipes H are perforated, as shown, to allow the air to escape in a series of jets at varying angles, and strike all parts of the fire. Such pipes may be arranged on all four sides of the furnace, as shown in the drawing, or on three or two sides, or only along the front wall of the furnace.

The air thus injected into the furnace supplies sufficient amount of oxygen to increase the combustion of the fuel so as to generate gas only, but not create any smoke.

In some furnaces, such as blast-furnaces or others of that class, hot air is the best to use for this purpose; but in locomotive or other furnaces cold air will answer all the purposes, and in that case the pipe D will open into the open air instead of into the hollow bridge-wall C, said hollow bridge-wall and hollow grate-bars being then dispensed with.

In some cases I make use of a perforated pipe, I, below the grate-bars, to get sufficient draft under the fire.

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

1. The combination, with a furnace, of one or more perforated pipes, H, arranged above

the fire-box, and a branch pipe or injector D E G, constructed and arranged substantially as and for the purposes herein set forth.

2. The combination, with a furnace, of the hollow grate-bars B, hollow bridge-wall C, branch pipe or injector D E G, and one or more perforated pipes, H, all constructed substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of November, 1874.

CHARLES GEARING.

Witnesses:
H. A. HALL,
B. F. DOWELL.