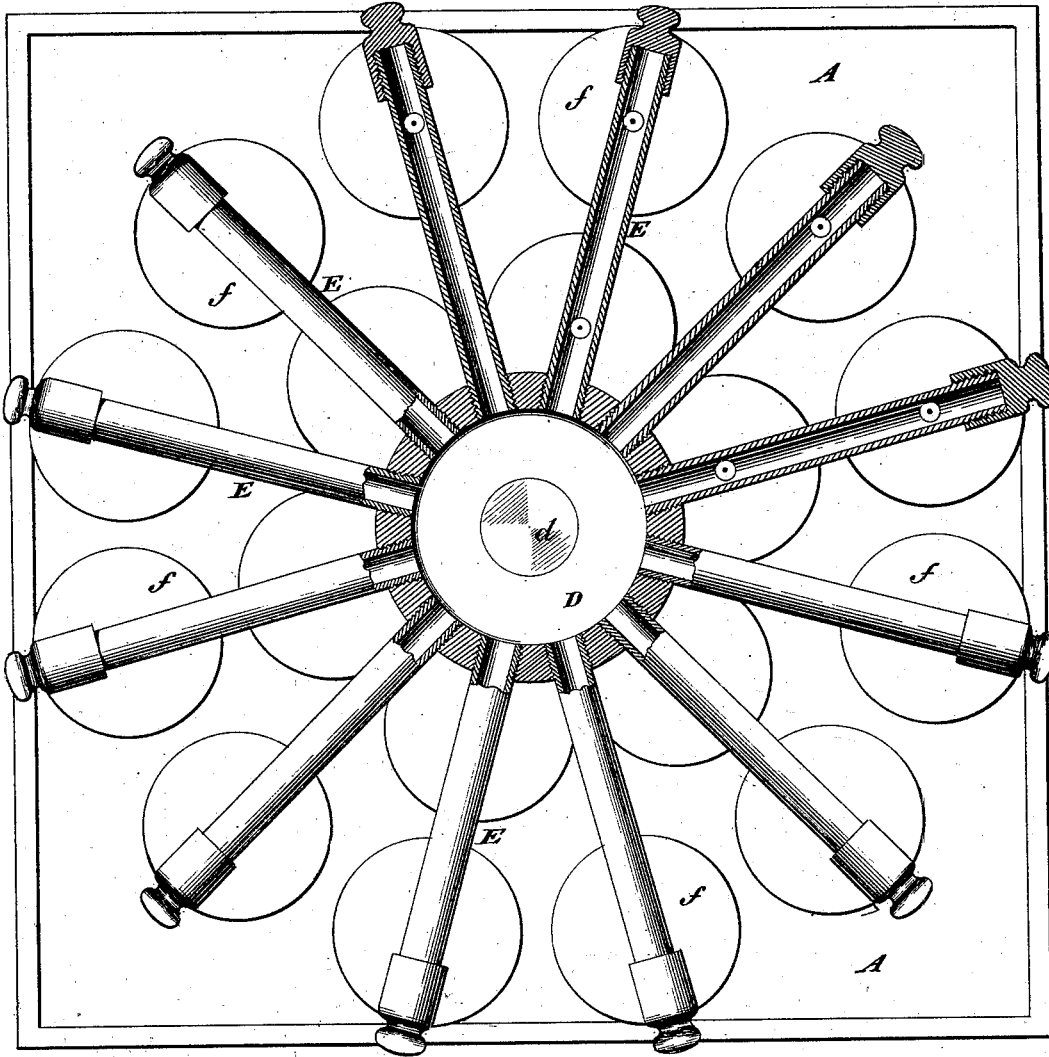


D. S. ELSTNER.
Device for Supplying Steam and Air-Blasts to Furnaces.

No. 203,434.

Patented May 7, 1878.

Fig. 1.



Witnesses.
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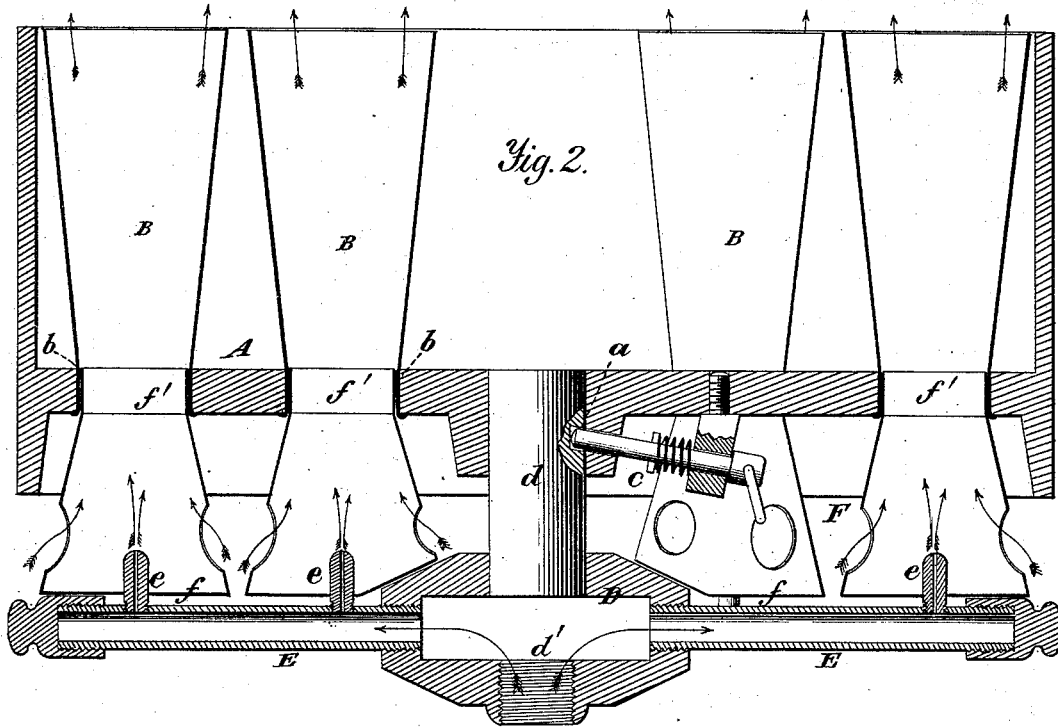


Fig. 3.

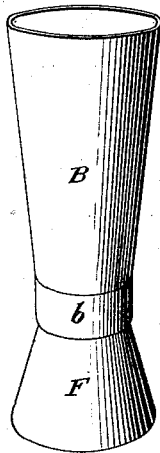


Fig. 4.

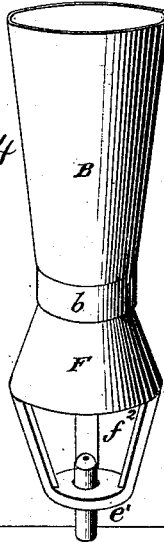
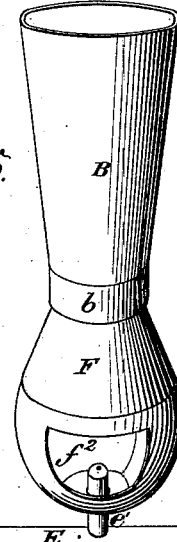


Fig. 5.



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UNITED STATES PATENT OFFICE.

DAVID S. ELSTNER, OF CANTON, OHIO.

IMPROVEMENT IN DEVICES FOR SUPPLYING STEAM AND AIR BLASTS TO FURNACES.

Specification forming part of Letters Patent No. **203,434**, dated May 7, 1878; application filed January 2, 1878.

To all whom it may concern:

Be it known that I, DAVID S. ELSTNER, of Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Devices for Supplying Steam and Air Blasts to Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification, and in which—

Figure 1 is a bottom view of my improved steam and air blasting apparatus, in which a number of parts are shown in section, or partly broken away, to exhibit their inner construction. Fig. 2 is a vertical section of the same in the direction of the line *x x x*. Figs. 3, 4, and 5 are illustrations of modified constructions of the blast-tubes shown in the preceding figures.

Corresponding parts in the several figures are denoted by similar letters.

There are numerous devices used for producing a blast in a furnace by directing a steam-blast through a large flue or orifice into a closed ash-pit, which, although much superior to the well-known steam-blower of original construction, have not proved effective enough to secure a ready sale. The chief objection to those blasts is the difficulty of regulating their supply of atmospheric air under the varying pressure within the ash-pit, which variation is due to the working of the fuel upon the grates, whereby the air-passages between them are constantly more or less obstructed, and the supply from the ash-pit is continually changed. As the steam-supply is always the same, the atmospheric air is, when the pressure in the ash-pit increases, prevented from entering freely into the same, and consequently the supply of atmospheric air to the burning fuel becomes insufficient for its proper consumption.

By careful observation and many experiments I have found that by dividing the steam-blast into a number of small jets, and by causing them to perform their functions separately, the supply of atmospheric air becomes more

steady and copious, and the consumption of the fuel more uniform and rapid.

The nature of my invention consists, first, in a steam and air blast combined, wherein the parts for mingling the steam and air are stationary, and the parts for producing the steam-jets and air-blasts to be mingled are made-removable; second, the construction of a stationary conical steam and air mingling tube, and a removable steam and air receiving and delivering conical tube, the small ends of the said tubes being fitted together; third, a removable steam-distributor, consisting of a central removable steam-drum with radial steam-pipes, each of which is provided with a number of nozzles or nipples, and receiving and guiding tubes; fourth, a coupling device, whereby the distributing apparatus with the receiving-tubes may be attached to or detached from its support; fifth, a biconical tube, closed at the bottom, and having lateral openings near the bottom; sixth, a steam and air receiving tube receiving air through side openings near the bottom.

In the drawings, A represents the side of an ash-pit, provided with a number of concentrically-arranged conical tubes, B, which are suitably fastened with their small ends *b* to the said bottom. A central hole or socket, *a*, in the bottom A, and a spring-bolt, *c*, serve to secure the head *d* of a drum, D, to the said bottom. An opening, *d'*, in the bottom of the drum D serves for the admission of steam. A number of steam-pipes, E, are radially attached to the drum D, and are provided with orifices or nipples *e*, which are centrally located below the tubes B. The nipples *e* are provided with tubes F, the bottoms *f* of which are attached to the nipples *e* or to the pipes E, and the upper parts *f*¹ of which are contracted and fitted into the lower ends *b* of the tubes B. The lower parts of the tubes F are provided with openings *f*² to admit air.

The operation of the tubes F would be the same if they had no bottoms, as shown in Fig. 3; but with bottoms fastened to the nipples *e* or pipes E they can very conveniently be removed and replaced by removing or replacing the drum D.

The shape of the lower part of the tube F

does not affect the operation of the tube, and in Figs. 4 and 5 I have shown some of the modified shapes I have successfully experimented with; but the upper part must be flaring from the contracted end *f* to the air-apertures *f*² below, in order to facilitate the drawing in of atmospheric air by the steam-jet. The upward increase of area of the tubes B must be in accordance with the increasing expansion of the air and steam during their ascent, with an appropriate force and maximum percentage of air. The tubes B are arranged as closely to each other as practicable.

Operation: When the fire is properly started and "steam up" the apparatus is supplied with steam, which enters the drum D and pipes E, and escapes with great force through the nipples *e*, and, in its passage through the tubes F, draws the air around it up through the concentrated parts *f* and into the tubes B, where its speed becomes reduced and it becomes thoroughly mixed with the air. It finally arrives at the grates with a force sufficient to pass through them and through the fuel. If the passage of the blast through the grates and fuel should be obstructed by the settling of heavier parts of the fuel, the combined blast of the tubes B becomes crowded within the ash-pit, and its pressure is thereby temporarily increased until the obstacles are removed thereby or by the thus-increased combustion, while the supply goes on without interruption. The plate A is from time to time removed to clear it from ashes, and the same is done with the drum D and its attachments; but, as my improved blast effects a very thorough combustion, and prevents the formation of cinders or clinkers in a great measure, such cleaning does not often become necessary. By contracting the tubes F, at *f*, a back pressure in the tubes B is prevented, and the supply of fresh air is, under all circumstances, the same. By flaring the tubes F, as described, the sucking force of the steam-jet is increased, and a greater supply of air is obtained, so that the percentage of air in my improved blast greatly exceeds that of other constructions.

I prefer removable nipples, *e*, to orifices in the pipes E, as the sediments of the boiler are often carried along by the steam and are deposited near the steam-outlets, which thereby become clogged and require cleaning.

I am aware that horizontal parallel dis-

charge-pipes have been secured at right angles to a perpendicular supply-pipe; but the system of radiation which I have made use of is far superior to the one just described, one point of superiority consisting in the uniformity of pressure over the entire blast.

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

1. In a steam and air blast, the combination of the perforated plate A, having conical tubes B, with their small ends fastened into its perforations, and the removable drum D, steam-pipes E, having nipples *e*, and conical tubes F, having their small upper ends loosely fitted into the small lower ends of the tubes B, whereby the said latter parts may be removed from the plate A and reinserted, substantially as set forth.

2. In the described steam and air blast, the combination of the stationary steam and air mingling tube B and the removable steam and air receiving tube F, steam branch pipe E, and nipples *e*, substantially as set forth.

3. In a boiler-furnace steam and air blast, E E, the steam-blast device consisting of the removable and readjustable steam-drum D, steam-pipes E, and nipples *e*, substantially as set forth.

4. The combination of the plate A, having a socket, *a*, and a spring-bolt, *c*, and the steam-distributing drum D, having a head, *d*, whereby the lower parts of the blast apparatus are kept in position and may easily be removed and replaced, substantially as set forth.

5. The combination of the stationary tube B and the removable receiving-tube F, having a closed bottom, *f*, and lateral openings, *f*², branch pipe E, and nipples *e*, substantially as and for the purpose set forth.

6. In a furnace steam and air blast, the combination of the steam-drum D and radiating steam-distributing branch pipes E, and a series of tubes in the ash-pit wall for receiving separately the steam from the steam-jets, substantially as shown and described.

In testimony that I claim the foregoing as my own I hereunto affix my signature in presence of two witnesses.

DAVID S. ELSTNER.

Witnesses:

A. L. ROTHACKER,
JOS. S. ELSTNER.