

J. JONES.
Hot Blast Oven.

No. 1,033.

Patented Dec. 10, 1838.

Fig. 1.

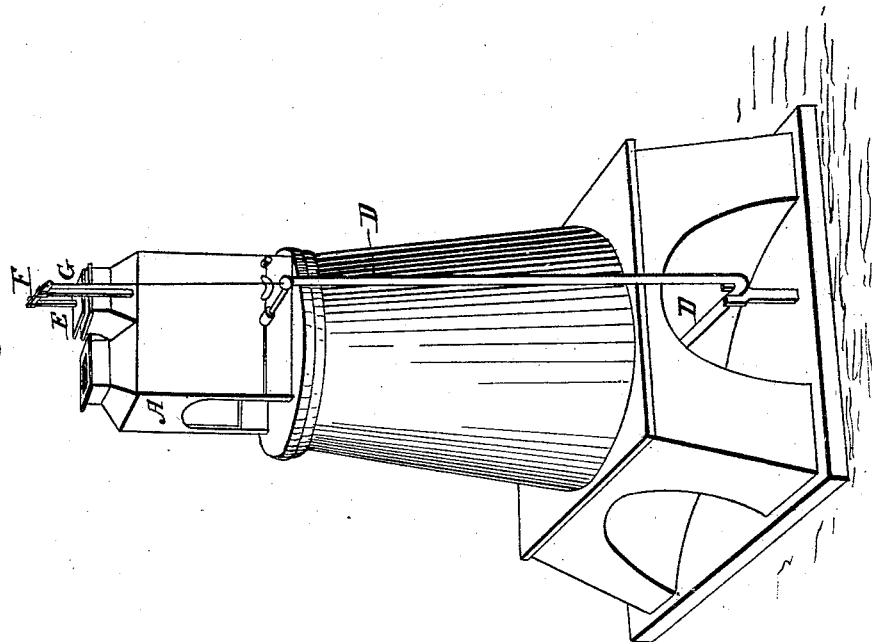


Fig. 2.

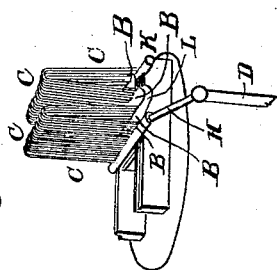
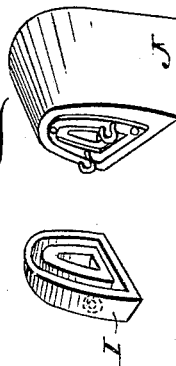


Fig. 3.



UNITED STATES PATENT OFFICE.

JOSEPH JONES, OF YORK, PENNSYLVANIA.

IMPROVEMENT IN THE MODE OF HEATING AIR FOR THE HOT-BLAST IN FURNACES.

Specification forming part of Letters Patent No. **1,033**, dated December 10, 1838.

To all whom it may concern:

Be it known that I, JOSEPH JONES, of the borough of York, in the county of York, in the State of Pennsylvania, have invented certain Improvements in the Construction of a Heating Apparatus for Hot-Blast for Furnaces as are to be Supplied with Heated Air; and I do hereby declare that the following is a full and exact description thereof.

In the early use of the hot-blast the air was heated in capacious cylinders or tubes of cast-iron, the fuel for heating it being contained in ovens or arches, through which the said cylinders or large tubes were made to pass, the fuel consumed in these ovens not being employed for any other purpose than the heating of the air. Means, however, were soon devised for employing the waste heat from the tunnel-head of the furnace for heating the air to be used in the blast. This has been effected by placing the oven on the side of the tunnel-head and opening a flue from it into the oven. Within this oven are placed a number of tubes, through which the air to be heated is forced to pass, and it has been found that the waste heat so applied has answered the intended purpose; but still it has been evident that a sufficient heating-surface has not been, upon this plan, exposed to obtain all the advantages from the waste heat which it is well calculated to supply, for it is a well-known fact that although the tubes have been kept red-hot the temperature of the blast has been generally but from 500° to 600°. The object of my first improvement is to obviate this difficulty by such an arrangement of the heating apparatus as shall expose a sufficient heating-surface to elevate the temperature of the blast to any desired extent.

The general mode of constructing the apparatus for heating from the tunnel-head has been to place three cylinders or tubes parallel to each other and in a horizontal position within the oven, raising them one or two feet above the bottom, so that the heat might circulate round them. On the upper side of the middle cylinder there have been usually ten openings, and upon the outer ones five, furnished with necks to receive tubes, through which the air to be heated is to circulate. These tubes are bent in form of the letter U

inverted, and their open ends are placed in the necks above named, five of them connecting each of the sides with the middle tube or cylinder.

In the accompanying drawings, Figure 1 is a perspective view of the furnace with the oven A upon it, and Fig. 2 is a view of the arrangement of the tubes constituting the heating apparatus as improved by me, and which is contained within the oven A.

Instead of three, I use four parallel tubes, B B, the two on each side forming a pair, which are connected together by the bent tubes C C, which rise vertically from B B. When I say "bent tubes" I refer to form only, not intending to say that they are actually bent, the fact being that they are cast in that form. The vertical portions of these tubes will generally be in separate pieces, and will be connected together by the curved upper ends fitting in sockets on them. By this arrangement, with four horizontal cylinders I am enabled to put double the number of bent tubes in the space occupied by half the number with the three horizontal pipes. The air to be heated is blown in at the end of one of the outer cylinders at K. It then rises in the first tier of ten (or more) vertical pipes and descends through the next tier into the second cylinder, which communicates by curved end L with the third cylinder, whence it is conveyed to the fourth in the same way as from the first to the second. With the fourth cylinder the conducting-pipe D D, leading to the tuyere, is connected. An effect nearly the same as this produced by the two middle cylinders may be obtained by using in place of cylinders curve-pipes somewhat like those used to connect the up end of the vertical tubes, or by enlarging the middle of the horizontal cylinder, and so forming it as to receive a double row of vertical tubes on each of the above-stated forms, may be used with success; but I consider the first-named plan the best and the most permanent.

What I claim as new and useful in this part of my improvement and invention is the construction of the pipes in the above-stated forms, so as to obtain the desired effect of increasing the fire-surface by means of two middle cylinders connected together, with curve-pipes at their ends, and the employment of any of the

above-named plans, so as to obtain a double row of vertical tubes in the middle.

My second improvement consists in the mode by which I regulate the quantity of heat admitted into the oven by causing the conducting-pipe to open or close a damper operating upon a self-regulating principle, depending upon the variations of temperature of the blast which the said conducting-pipe is exposed to. The damper E is a flat plate of iron fitted on the top of the oven-chimney, which, by being closed, stops the rush of the flame and heat into the oven. The damper is attached to the end of the long arm of a lever, F, the short end of which is hooked to a rod, G, attached to the upper end of the conducting-pipe D, which has a flexible joint, by which it is united to the connecting-tube H. The rod G, attached to the short arm of the lever, must be made adjustable on that arm, so as completely to regulate the action of this part.

What I claim as my improvement in this part of the apparatus is the employment of the hot-air-conducting pipe to open and close a damper in the chimney, in the manner set forth.

My third improvement is in the manner of

constructing a water-tuyere so as to cause it to be much less liable to get out of repair than the water-tuyeres now employed, and to render it of easy repair when it becomes necessary. The mode of making such tuyeres heretofore followed has been to cast them in one single piece, forming a chamber near their front ends by means of a core. Such tuyeres, however, are very defective, and are incapable of being repaired. My improvement consists in casting the tuyere in two pieces, in the manner shown in Fig. 3, where I is the front and J the back end of the tuyere. These parts, when put together, are secured by suitable bolts and nuts, leaving the hollow chamber and the apparatus for the passage of water as heretofore.

What I claim as constituting my invention in this part of the furnace is—

The casting of the tuyere in two parts, so that the part which constitutes its point or front end may be readily renewed whenever the same may be necessary.

JOSEPH JONES.

Witnesses:

W. THOMPSON,
LINTON THORN.