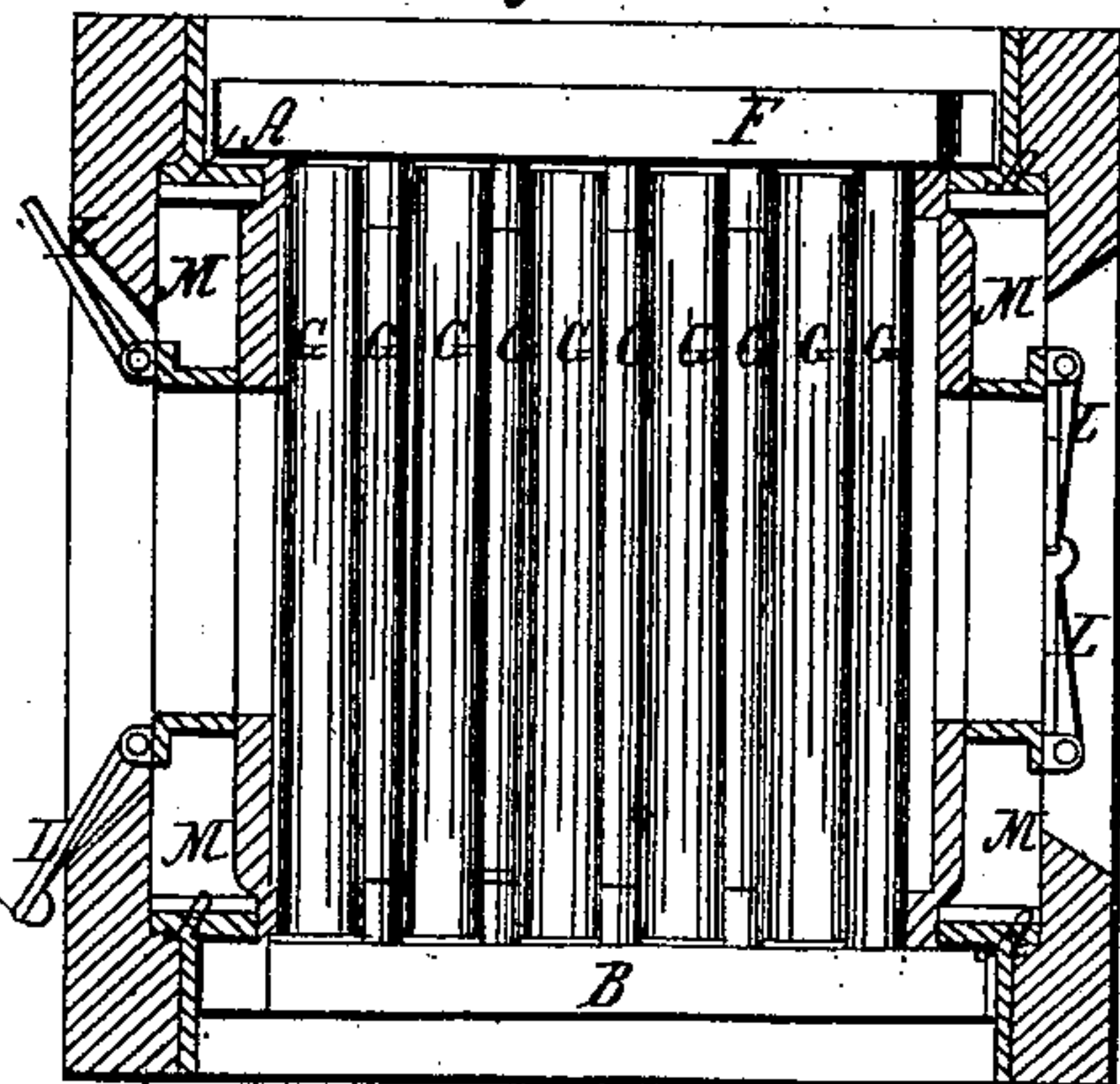
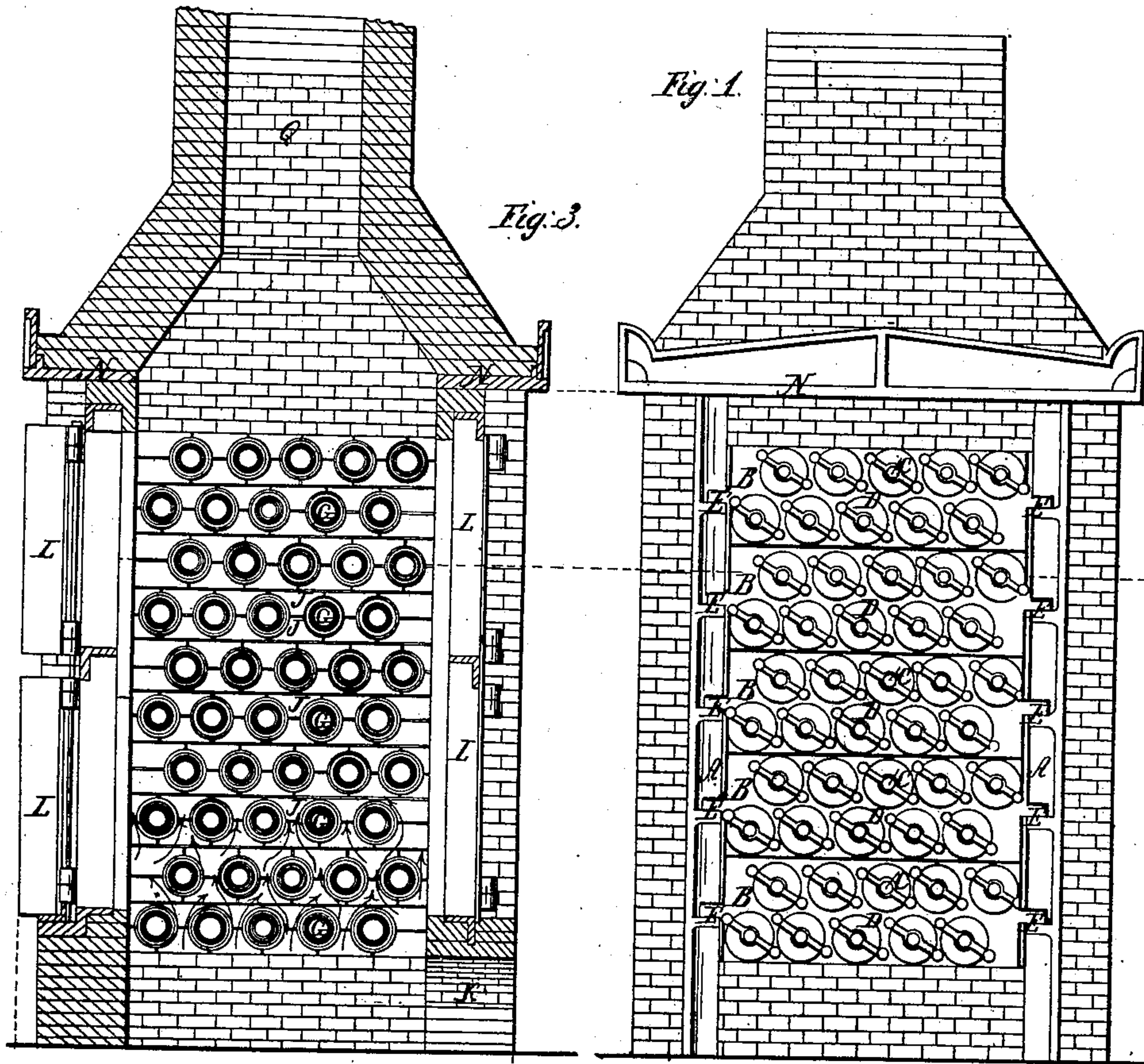


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APPARATUS FOR HEATING AIR.

No. 33,521.

Patented Oct. 22, 1861.



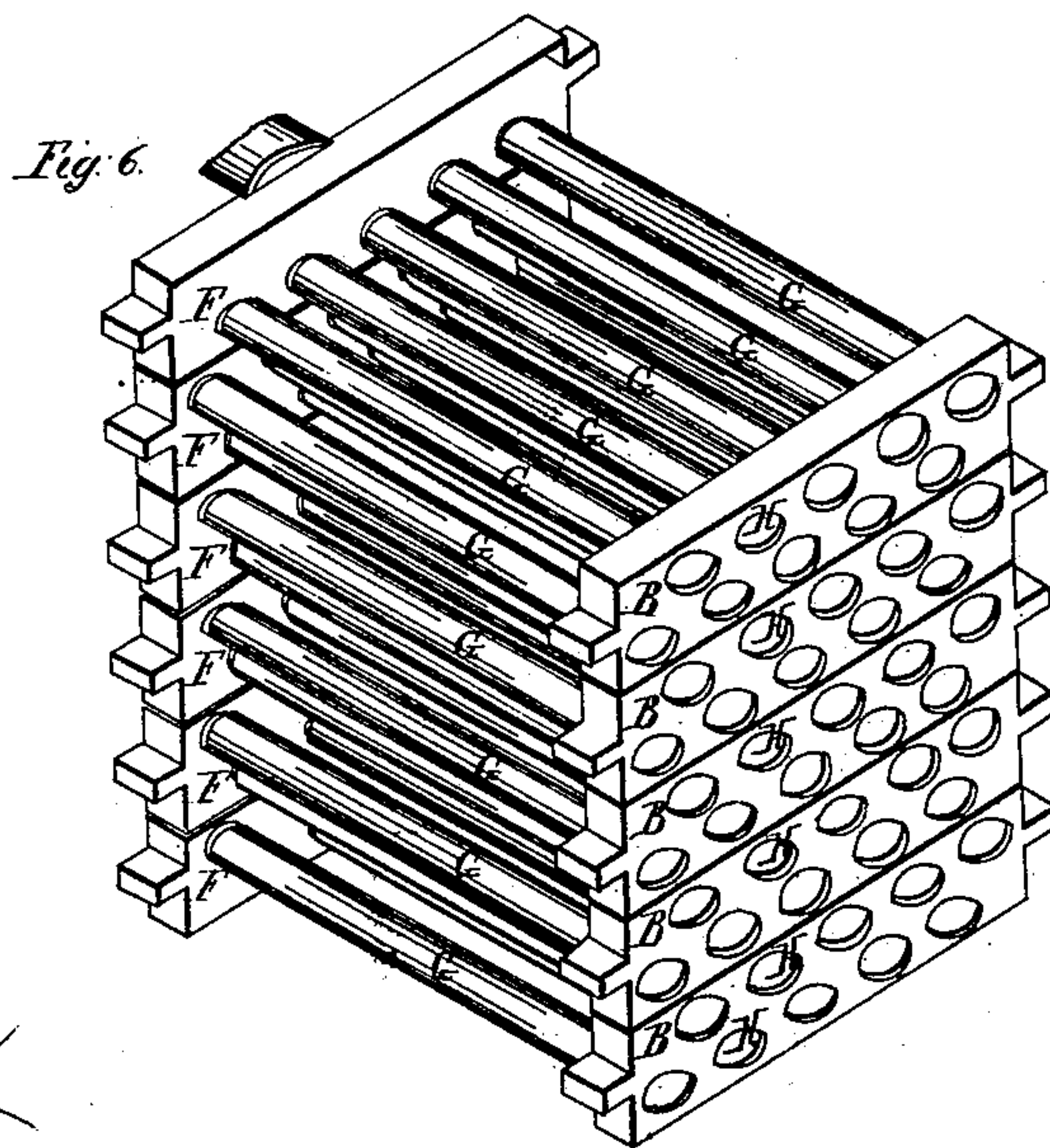
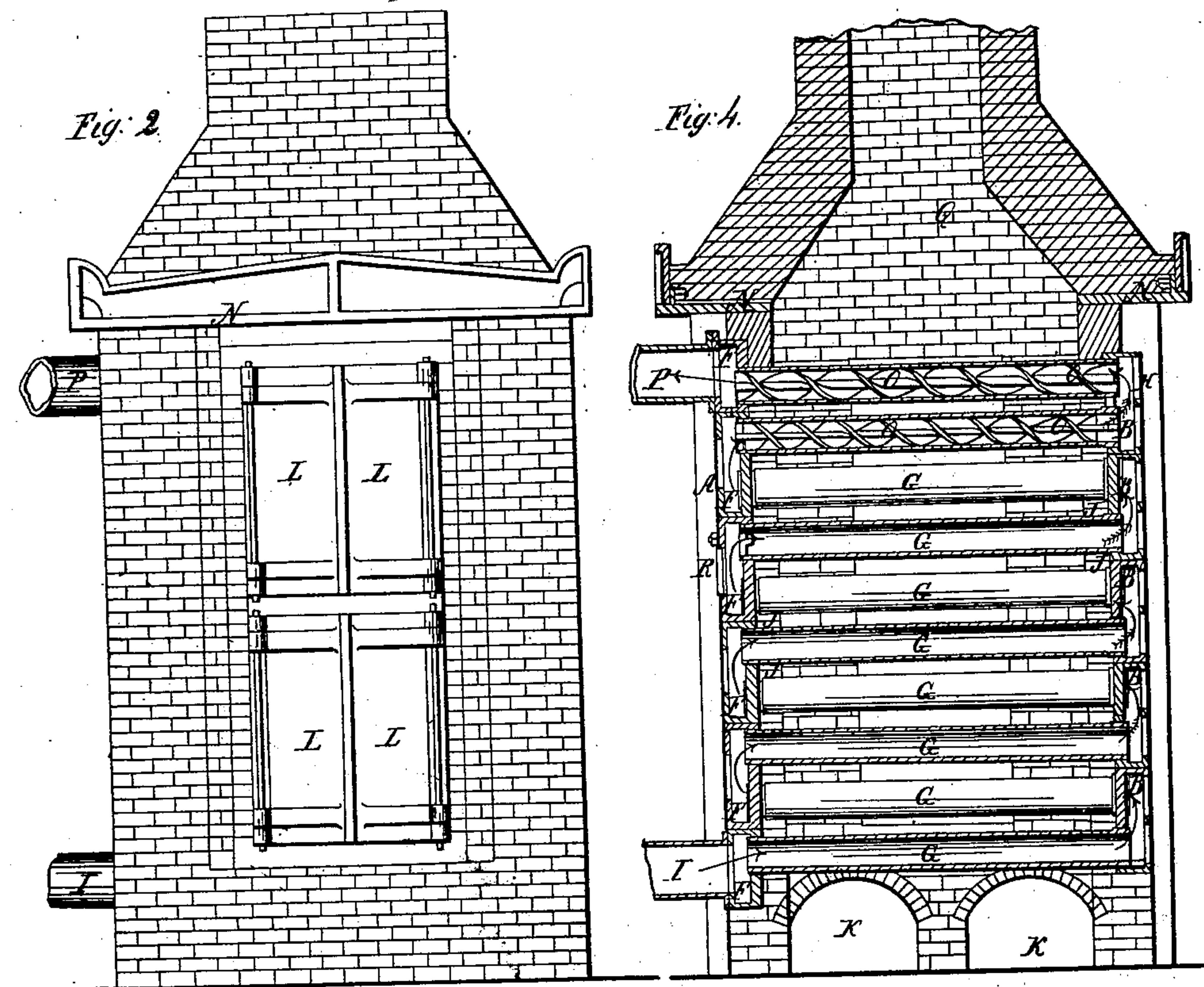
Witnesses;  
O. J. Moore  
Attest: Kerr

Inventor;  
Henry Davies

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# UNITED STATES PATENT OFFICE.

HENRY DAVIES, OF PORTSMOUTH, OHIO.

IMPROVED APPARATUS FOR HEATING AIR FOR BLAST-FURNACES, &c.

Specification forming part of Letters Patent No. 33,521, dated October 22, 1861.

*To all whom it may concern:*

Be it known that I, HENRY DAVIES, of the city of Portsmouth, in the county of Scioto, in the State of Ohio, have invented an apparatus for heating air for blowing hot-blast furnaces for smelting iron ore and for blowing cupola for melting iron, and commonly called a "hot-blast;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of said apparatus or hot-blast, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a front elevation; Fig. 2, a side elevation; Fig. 3, a transverse section taken through Fig. 1; Fig. 4, a transverse section taken through Fig. 3; Fig. 5, a plan in section; Fig. 6, a perspective view of the apparatus removed from the brick-work and frame.

The same letters of reference refer to the same parts in the different views.

A A, Fig. 1, are two stands supporting five boxes, B B B B, by means of brackets cast onto said stands, and shown at E E E.

D D are covers, fifty in number, (in the plan as shown,) fitted into holes cast in the boxes B B B in the position indicated by the covers. Each of said covers is held in its place by a cross-bar, C C C, Fig. 1, and made tight by means of two bolts, one in each end of said cross-bar. The opposite side of the apparatus has two stands, like those in front, but with one more bracket in each to support six boxes, F F F, Figs. 4 and 6, to correspond with them in front. The four stands will be seen in section at A A A A, Fig. 5; also, the top edge of the boxes B and F in same figure.

In Fig. 4 the boxes B and F are shown in section.

G G G are ten rows of pipes fitted into the boxes B and F. The holes in the boxes into which the pipes fit are bored out, and the ends of the pipes are turned true to fit tight into said holes. The holes in the boxes B are larger than the holes in the boxes F, and the end of the pipes at that end made larger to fit, so that any pipe may be taken out through the hole H in Figs. 4 and 6, one of which is opposite the end of each pipe, and made a trifle larger than the large end of the pipe to allow said pipe to pass through into their places. These holes H H H are the same as those covered by the covers D D D in Fig. 1. The boxes F F

have each a hole cast near the center, on the outside, large enough to admit a man's hands, to enable him to fix the tackle to put said pipes in or take them out when required. The pipe I, Figs. 2 and 4, is for the purpose of letting in the air to be heated, and the pipe P, same figures, is for conducting it away to the tuyere.

J J J is a fire-brick wall, built up in the inside of the boxes B and F, to protect said boxes and the joinings between them and the pipes G G G from being burned.

K K are two openings to admit the fire into the chimney containing the pipes. In Fig. 3 will be seen a transverse section of these pipes, showing their relative position to each other and corresponding exactly with the covers D D in Fig. 1.

J J J in Fig. 3 is the fire-brick wall to protect the boxes F F, and from which will be seen the form of the brick to be used in the construction of said wall.

L L L L, Figs. 2, 3, and 5, are doors closing four openings into the apparatus, to enable the workman to see what is going on and to sweep the pipes clean when required. At M M M M, Fig. 5, it will be seen that these door-frames are connected with the frame which supports the boxes B and F, for the purpose of making it sufficiently strong.

N N N, Figs. 1, 2, 3, and 4, is a large casting resting upon the top of the stands A A A A, and bracing them in their places. Said casting has a large opening in the center for the chimney. The bottom of the stands should have also a foundation-plate of the proper form to make it strong and secure.

Fig. 6 is a perspective view of the pipes G G G and boxes B and F put together, but entirely clear of the brick-work.

At Fig. 4 in the two top pipes G G are two screws, O O. These screws are cast separate from the pipe, and are put in their places after the pipes are fixed. It is intended that there should be one of these screws in each pipe. At the small end of one pipe or more in each tier of pipes a cross-bar and bolt passing through the boxes F F, with a nut on the end, as shown at R, Fig. 4, should be used to secure the pipes in their proper places in the boxes; also, a small collar or taper on the opposite end of the pipes should be used for the same purpose.

Having described my invention, I will now



proceed to describe the operation. The fire enters the chimney containing the pipes through the opening K K, Fig. 4, and makes its way up between the pipes; but as the second row of pipes are over the spaces of the first, it will be checked and compelled to take the direction of the arrows shown in Fig. 3. The air from the blowing-machine is introduced by the pipe I, Figs. 2 and 4, and takes the direction of the arrow through the lower row of pipes into the bottom of the box B, passes upward and enters the second row of pipes from the upper side of said box, and is conveyed into the lower part of the second box in the tier of boxes F F, and so on from the top of one box to the bottom of the one on the opposite side until it escapes at the pipe P and is carried to the tuyere of the smelting-furnace or cupola. I have described the air as entering at the bottom and passing out at the top; but it will be seen that it may enter at the top and pass out at the bottom, and in some cases this may be preferred, as the hot

air would leave at the hottest part of the pipes.

It will be seen that when the air passes through the pipes it will have to take a circular spiral course. This circular motion will produce centrifugal force, and as the colder particles of air will be the heaviest, they will be constantly thrown out against the inside of the pipes and displace or dislodge the hot particles already heated, thereby increasing the heat of the blast and keeping the pipes cool.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The pipes G, boxes B and F, and covers D, when constructed, combined, and arranged substantially as and for the purposes set forth.

2. The construction and use of tubes, through which air is to be passed for the purpose of being heated, with an internal spiral partition or screw, substantially as set forth.

HENRY DAVIES.

Witnesses:

O. F. MOORE,  
ADAM KERR.