3 Sheets—Sheet 1.

C. C. ALGER.

Hot-Blast Oven.

No. 819. Patented June 30, 1838.

Fig. 3.

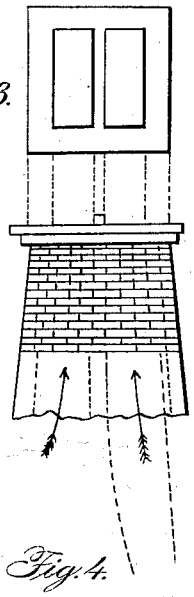


Fig. 1.

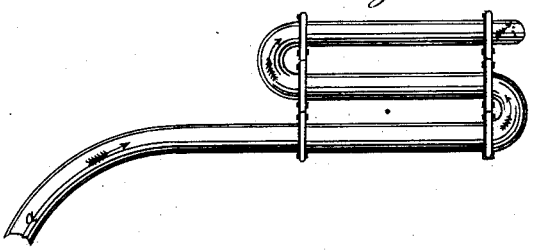


Fig. 4.

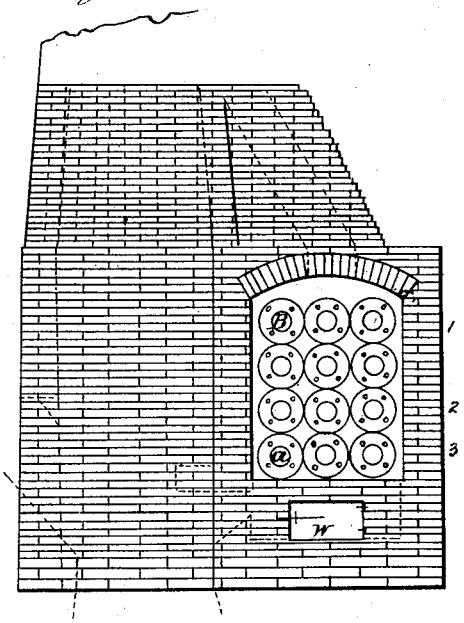
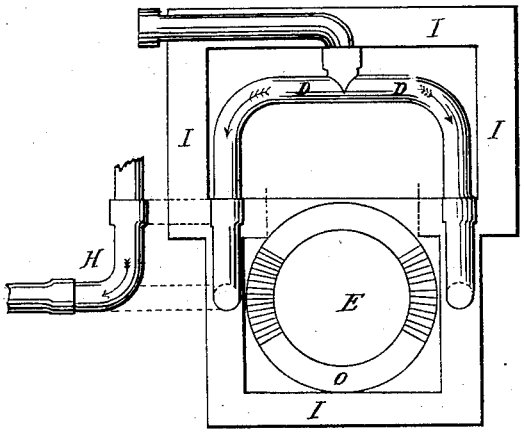


Fig. 2.



3 Sheets—Sheet 2.

C. C. ALGER.

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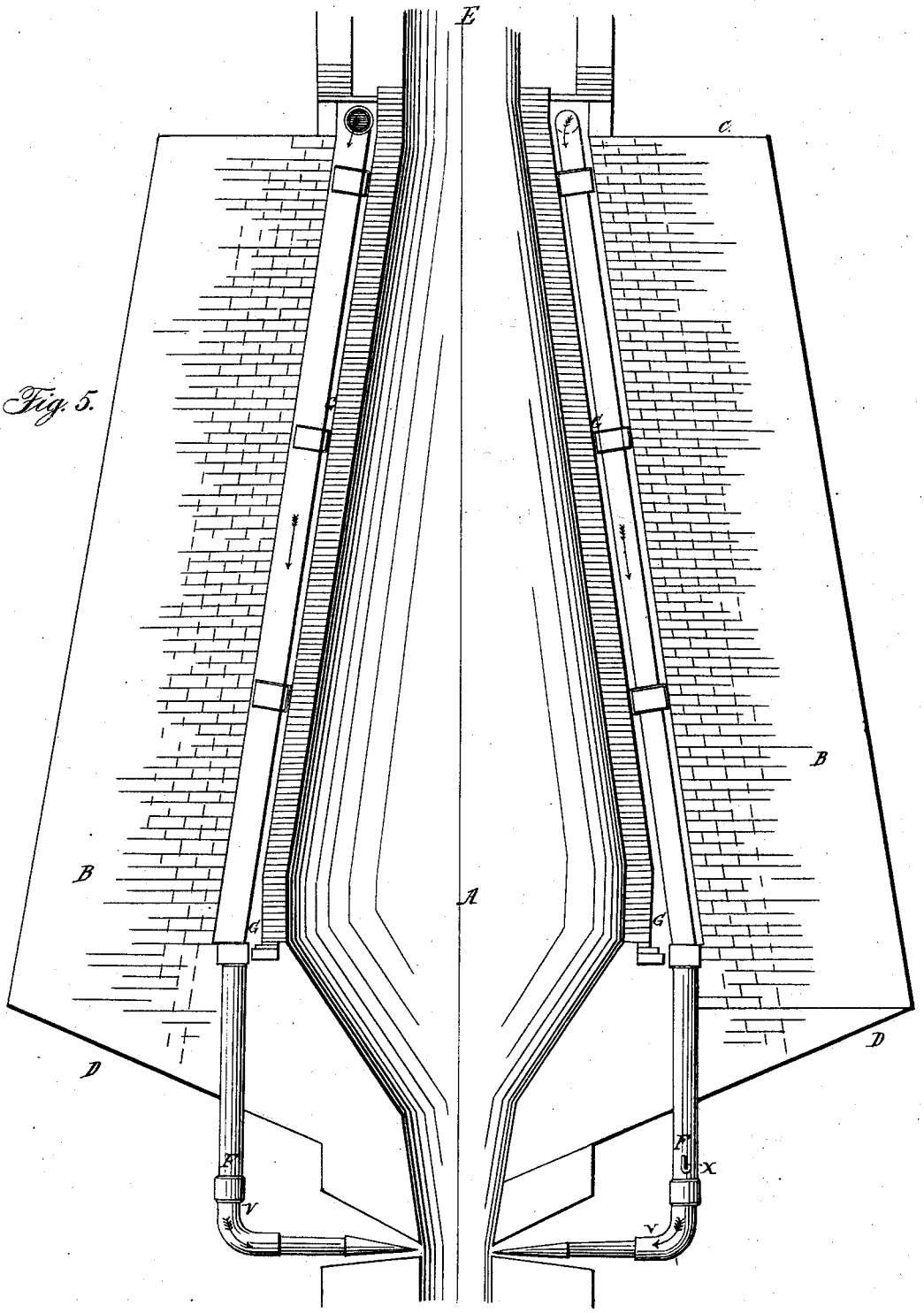
Fig. 5.



3 Sheets—Sheet 3.

C. C. ALGER.

Hot-Blast Oven.

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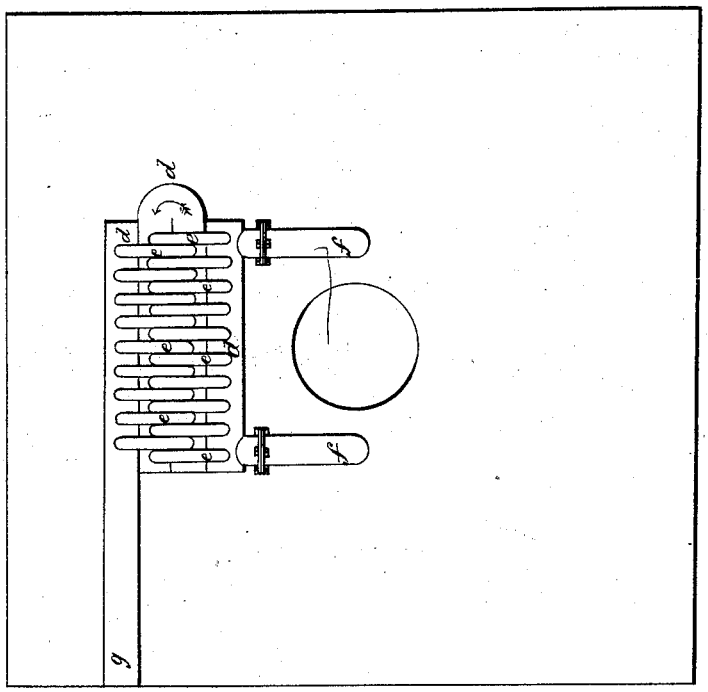

Fig. 7.

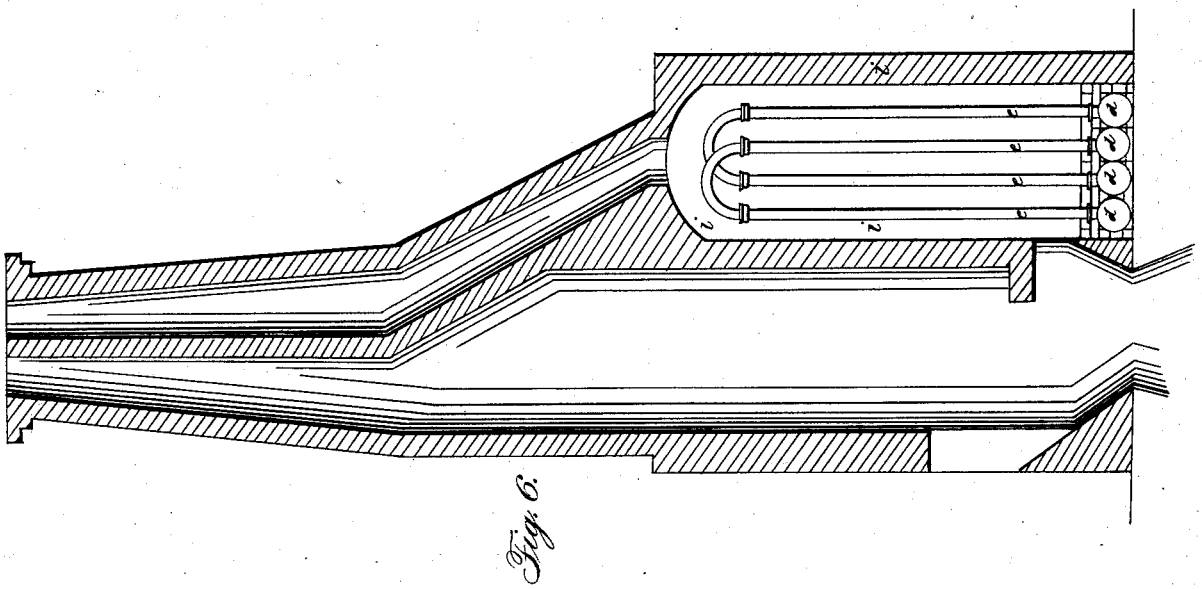

Fig. 6.

UNITED STATES PATENT OFFICE.

CHARLES C. ALGER, OF STOCKBRIDGE, MASSACHUSETTS.

IMPROVED MODE OF HEATING THE BLAST IN FURNACES.

Specification forming part of Letters Patent No. **819**, dated June 30, 1838.

To all whom it may concern:

Be it known that I, CHARLES C. ALGER, of Stockbridge, in the county of Berkshire and State of Massachusetts, have invented an Improvement in the Mode of Heating the Air at the Tunnel-Head of Blast-Furnaces, to be used as a hot-blast in smelting-furnaces; and I do hereby declare that the following is a full and exact description thereof.

Modes of heating the air to be used for the hot-blast by the waste heat of the top of a furnace-stack have been devised and carried into operation by others, and it is only to the particular manner in which I carry the heated air from the tunnel-head to the tuyeres that I intend to make any claim as belonging to me. My plan consists in forcing the cold air from the blowing-cylinder through twelve or any other preferred number of tubes placed in masonry at the top of the stack, near the tunnel-head, and so arranged that the flame that issues from the furnace may pass around them as freely as possible. The air being urged through these tubes is thereby made to acquire a very elevated temperature, to preserve which I bring the hot air down to the tuyeres through pipes descending in the body of the stack.

In the accompanying drawings, Figure 1 represents the first course of pipes, that marked *a* being the pipe which conducts the blast from the blowing apparatus into the series of heating-pipes.

Fig. 2 shows the division of the dividing-pipe, which is branched to carry the blast down on opposite sides of the stack. The pipe C conducts the heated air into the dividing-pipe D D. The top of the stack is shown at E, the lining of the furnace being designated by the letter O. The outside wall of the heating-oven and furnace, one foot thick, is seen at L I. The flueway from the main heating apparatus is carried into the main chimney and divided, as shown in Fig. 3.

Fig. 4 represents in profile or side view the manner in which the tubes and elbows are placed in the heating-oven. In this figure, *a* represents the tube by which the cold air enters the series, and B that from which the heated air escapes, through C, Fig. 2, to the dividing and side pipes. The heating chamber or oven is so constructed that the ends of it, where the pipes are connected, can be readily removed for the purpose of making any necessary repair without disturbing any part of the mason-work.

Fig. 5 exhibits a general section of the furnace, showing the position of the pipes in the stack, which lead the hot-air from the tunnel-head to the tuyeres. In this figure, A shows the body of the furnaces; B B, the stone-work; C C, the top stone-work and level top house; D D, the tuyere-arches; E, the tunnel-head; F F, the pipes, which are seven inches in diameter, which convey the hot air to the tuyeres. The straight parts on which the letters are marked, and which rise perpendicularly from the tuyeres, are secured in a cast-iron socket running into the stone-work far enough to sustain the whole weight of the pipes above them extending to the tunnel-head. They are also secured in their positions by stout staples of wrought-iron fastened into the stone-work. A space, G G, is allowed around the pipes to equalize the heat. This space is continued around the crooked pipe H, Fig. 2, which is a section of the side pipe, showing its turn at the tunnel-head. I leave small holes at V V, for the purpose of trying the heat of the blast. X represents the place of the mercurial gage, for showing its pressure. Nos. 1, 2, 3, 4, Fig. 4, make the places where there may be small doors to be opened for the purpose of cleaning the pipes from dust, and W a door to take out the dust and to regulate the heat by opening or closing. There is one such door at each end. The dotted lines in this figure show the direction of the chimney-flue to the heating-oven arch 2.

Instead of the mode above described of arranging the flues near the tunnel-head for heating the air, I intend sometimes to adopt the following, which I have essayed and found to answer the intention perfectly well, the air heated in these tubes being in either case conducted down to the tuyeres through tubes inclosed in the body of the stack, to preserve and augment the heat, as described:

Fig. 6 is a vertical section of the chimney, with the heating-oven and the tubes arranged therein, and Fig. 7 is a top view, intended to show more perfectly the manner in which the tubes are connected together. The pipes or tubes *d d d* are laid horizontally, and the tube *e e e e* rise vertically from them, being bent into the form of the letter U inverted, or hav-

ing semicircular tubes connecting them at their upper ends and fitted into them by conical joints or otherwise.

The manner of arranging and combining the tubes *e e e e* so as to conduct the air from one of the horizontal tubes to another will be readily perceived by the drawings. The vertical tubes touch each other at their upper or curved ends, and thus mutually support each other, which is important in the highly-heated state to which they are brought when in use. The descending pipes, which carry the heated air to the tuyeres, are immediately under and are a continuation of the horizontal tubes *f f*, the cold air from the blowing apparatus entering at *g*. The two ends of the heating-oven *i i i* are built up with fire-brick or other masonry, so as to form panels which may be taken down for the purpose of repairing the heating-tubes without disturbing any other part of the structure. The double chimney shown in Fig. 1 enables me, by the use of the necessary dampers, to govern the passage of the flame and heated air through the heating-oven with the utmost facility.

What I claim as constituting my invention in the arrangements of the above-described apparatus is—

The manner of bringing down the heated air to the tuyeres through tubes built in the body of the stack, as herein set forth.

CHAS. C. ALGER.

Witnesses:
HORATIO BYINGTON,
WALTER WRIGHT.