U. B. STRIBLING.

CUPOLA FURNACE.

No. 192,306. Patented June 19, 1877.

Fig. 1.

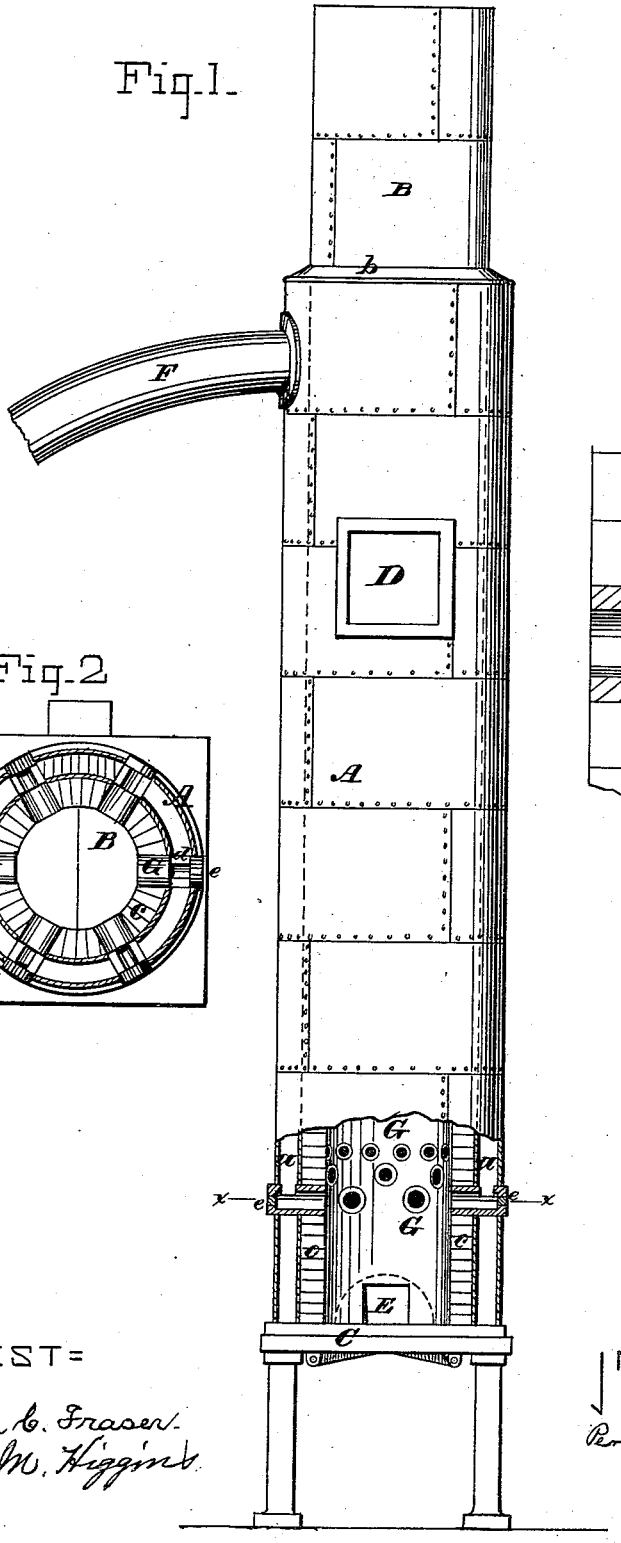


Fig. 2.

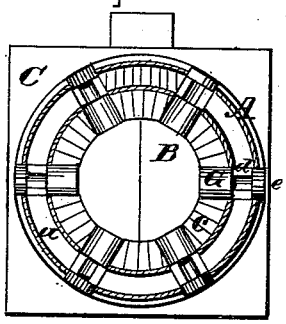
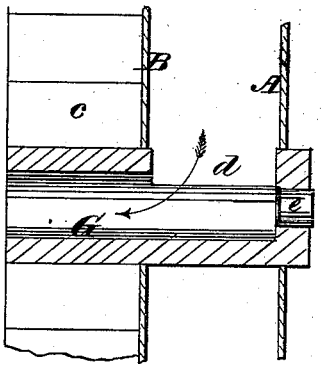


Fig. 3.



ATTEST=

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UNITED STATES PATENT OFFICE.

URIAH B. STRIBLING, OF MADISON, INDIANA, ASSIGNOR TO HIMSELF AND ISAAC N. TODD, OF SAME PLACE.

IMPROVEMENT IN CUPOLA-FURNACES.

Specification forming part of Letters Patent No. 192,106, dated June 19, 1877; application filed April 11, 1877.

To all whom it may concern:

Be it known that I, URIAH B. STRIBLING, of Madison, in the county of Jefferson and State of Indiana, have invented certain Improvements in Cupola-Furnaces, of which the following is a specification:

This invention relates most particularly, but not wholly, to that class of cupola-furnaces used for melting cast-iron; and the invention consists, partly, in constructing the cupola with a double shell, thus forming an annular air-chamber, which receives the blast from the blower, warms or heats it, and then delivers it to the melting charge through a series of tuyeres; also, partly in the peculiar construction of the tuyeres and partly in their general arrangement, all of which will be hereinafter set forth.

In the drawings, Figure 1 represents a rear elevation of a cupola embodying my invention, a portion of the shells being broken away to show the interior. Fig. 2 is a cross-section of Fig. 1, taken in the plane of the line *x x*. Fig. 3 is an enlarged sectional view, showing the construction of the tuyeres.

In the ordinary construction of the iron-molder's cupola the wall or shell of the same is single, and cold air direct from the blower is admitted through tuyeres from opposite sides.

In my improved form, let A represent an outer tubular shell, which may be of plate or sheet iron, and B an inner shell, similarly constructed and arranged concentric with the first. This leaves an annular air space or chamber, *a*, between the shells, which should be capped by a ring-cover, *b*, so as to make the chamber *a* air-tight. These shells may be mounted on a platform or stand, C, in the usual way, and the inner shell lined with fire-brick *c*.

D is the charging-door, the frame of which connects the two shells, so as to prevent the escape of air from the chamber *a*. The opening E for "tapping out" is constructed in a similar manner.

F is the blower-pipe, which taps the outer shell above the charging-door, near the top of said shell.

G G are the tuyeres. These I have shown arranged in three tiers, those of the lower tier being the largest and those of the upper tier the smallest. The upper tier contains twelve tuyeres, and the two lower six each. No one is directly above any other. By this arrangement the blast is more evenly distributed as it enters the melting-chamber than in the ordinary arrangement.

The tuyeres are peculiarly constructed, as clearly shown in Fig. 3. A tube of cast-iron or some suitable refractory material, long enough to extend through both shells and the fire-brick lining, is cut away at *d*, where the tuyere crosses the annular space *a*, to admit air from the blower into the hollow of the tube. At *e*, in the closed outer end of the tuyere, is a small hole, usually kept plugged up when the furnace is in operation. This hole, when opened, allows the operator to view the interior of the furnace, and also permits the insertion of a clearing bar or rod to remove obstructions from the mouth of the tuyere, should it become stopped. The opening *d* should equal in area the caliber of the tuyere, and the hole *e* may equal the tuyere in caliber; but in those of large caliber I prefer to make it less.

In the precise arrangement herein shown the upper tier of tuyeres have a caliber of 1.5 inches, the second 2.0 inches, and the lower tier 3.0 inches; but these proportions may be varied to some extent without departing from the principle of my invention.

The area of the blower-pipe F should equal or exceed the combined areas of the tuyeres used, and I prefer to connect it with the outer shell at the top or upper part of the same, anywhere above the charging-door D, so that the air may become heated in its passage down to the tuyeres, which are usually placed but a short distance above the melting-hearth of the cupola. Two or more blower-pipes may be used, and they may tap the outer shell at varying heights, as convenience and circumstances may dictate; but I believe the arrangement shown capable of producing the best results.

It is obvious that the higher up the outer shell is carried the higher will be the temperature of the blast, and in practice I have built

them thirty feet high; but this will also vary according to the circumstances of the case.

The advantage resulting from the use of a warm or hot blast is that the molten metal flows more freely into the mold, and makes more perfect castings. By its use, also, a greater proportion of scrap-iron can be used than with a cold-blast in the production of the same quality of castings.

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

1. A cupola-furnace having a double shell extending from the platform or fire-bed C to a point above the charging-door D, a blower-pipe, F, connected with the air-space *a*, as shown, and two or more rows of tuyeres, G G, cut away at *d* to form side inlets, and supported at their outer ends in the outer shell A, all in the manner substantially as set forth.

2. In combination with the shells A B, arranged to form a continuous annular air-space, *a*, extending from the fire-bed at C to the ring-cover *b* above the charging-door D, the tuyeres G G, cut away at *d* to form a side inlet, the back ends being supported in the outer shell A, substantially as herein shown and described.

3. In a cupola-furnace, a tuyere provided with an opening in the side to admit the air-blast, and an opening in the outer end to admit of viewing the interior or clearing out the tuyere, substantially as set forth.

4. In a cupola-furnace having a double shell and an air-space, *a*, extending from a point below the tuyeres to a point above the charging-door, a series of tuyeres of different caliber, in tiers, the smallest above and the largest below, the said tuyeres being supported at the outer end in the outer shell, all substantially as herein set forth.

5. The combination of the outer shell A, extending from a point below the tuyeres to a point above the charging-door, inner lined shell B, blower pipe or pipes F, and tuyeres G G, the latter being of different calibers, having side inlets *d* and openings in the outer ends for viewing, and arranged in tiers, substantially as shown.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

URIAH B. STRIBLING.

Witnesses:

JOS. TODD,

WALTER W. BENTLY.