(No Model.) 2 Sheets—Sheet 1.

J. BLAKENEY.

CUPOLA FURNACE.

No. 518,482. Patented Apr. 17, 1894.

Fig: 1.

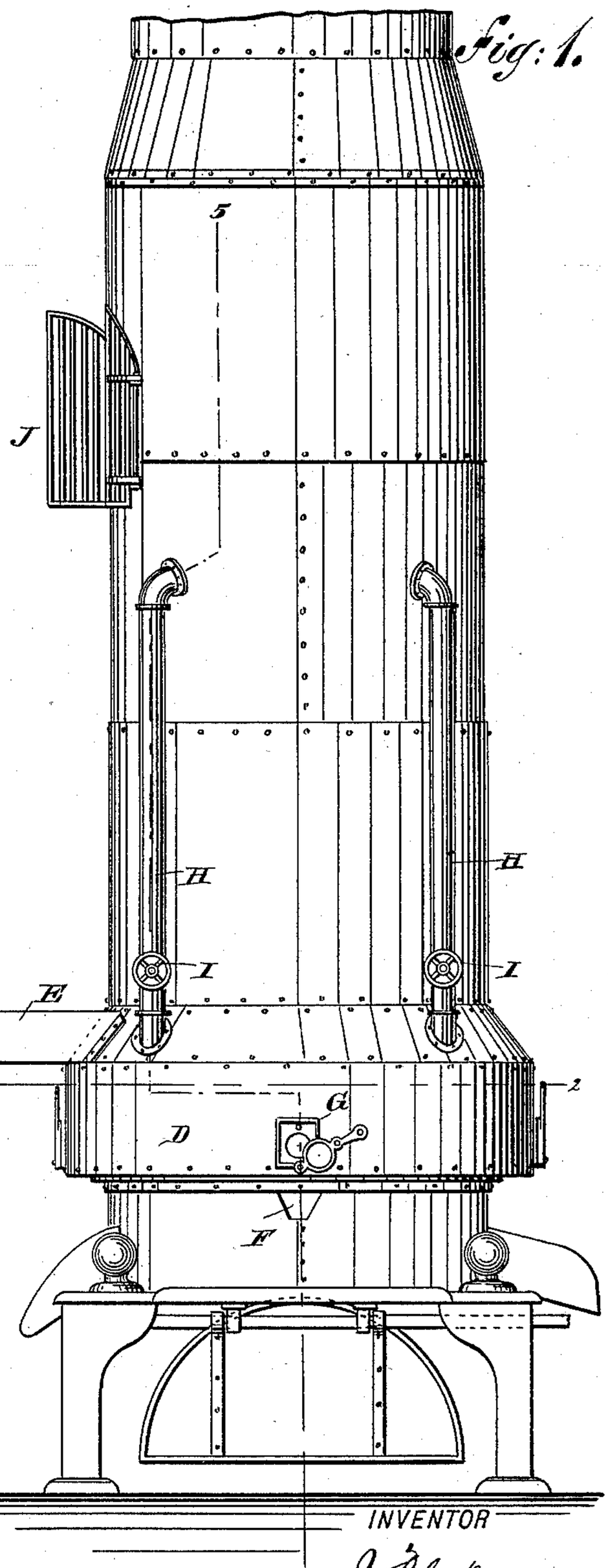


Fig: 3.

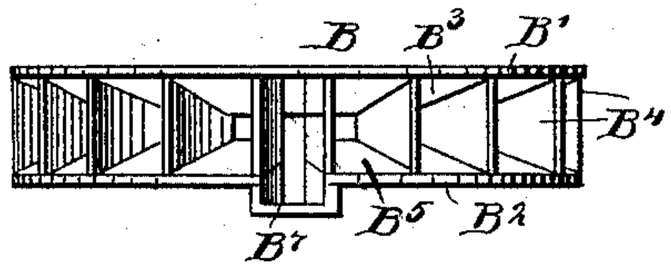


Fig: 4.

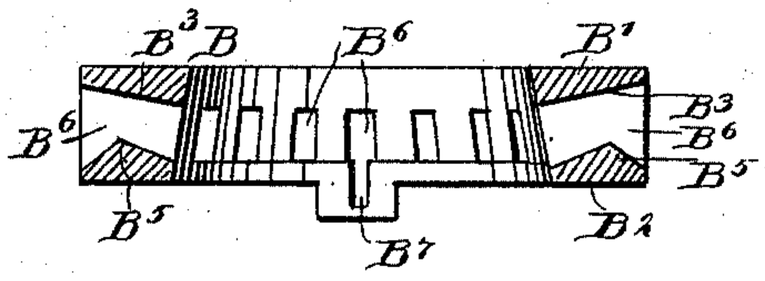
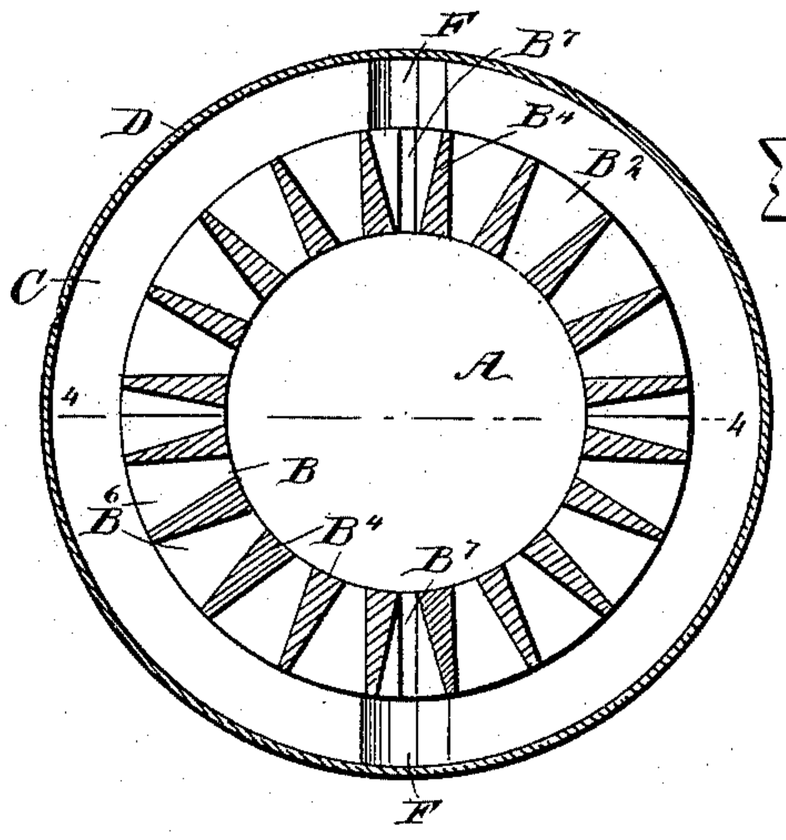


Fig: 2.



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(No Model.) 2 Sheets—Sheet 2.

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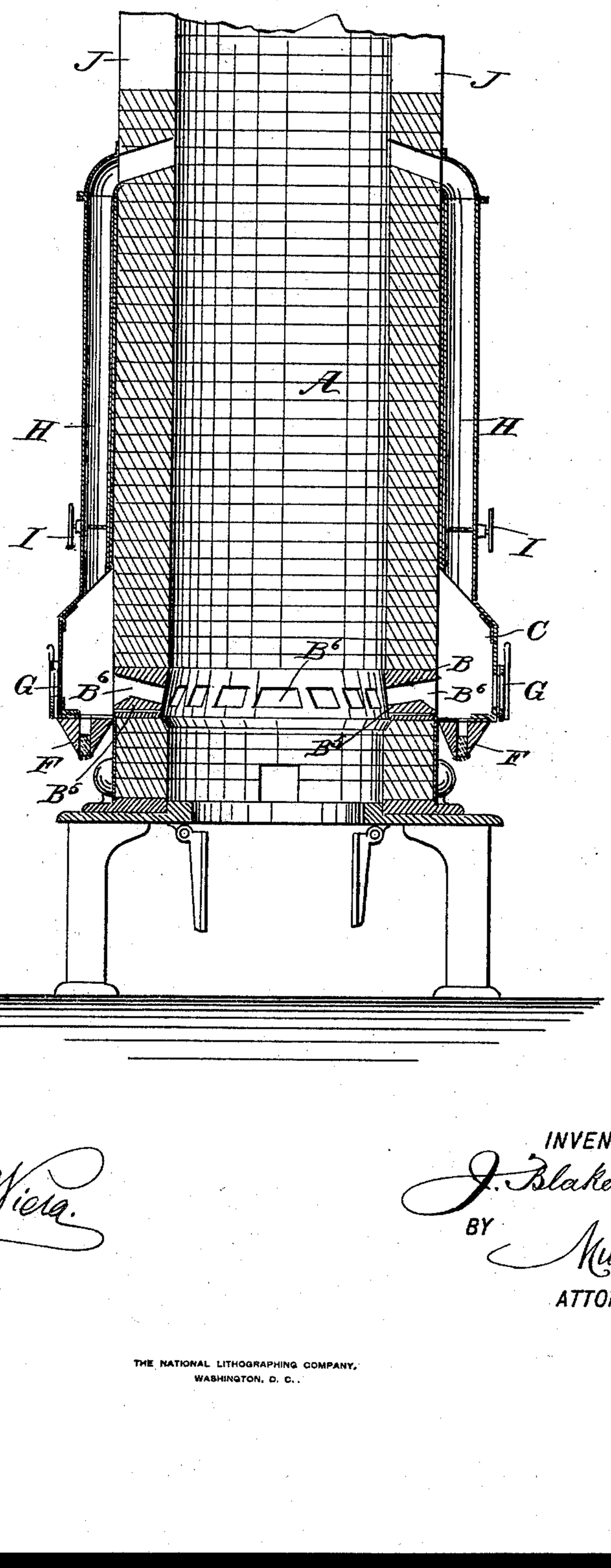
Fig: 5.



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JAMES BLAKENEY, OF SPRINGFIELD, OHIO.

CUPOLA-FURNACE.

SPECIFICATION forming part of Letters Patent No. 518,482, dated April 17, 1894.

Application filed June 9, 1893. Serial No. 477,038. (No model.)

To all whom it may concern:

Be it known that I, JAMES BLAKENEY, of Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Cupola-Furnaces, of which the following is a full, clear, and exact description.

The object of the invention is to provide certain new and useful improvements in cupola furnaces, whereby the air blast can readily pass to the center of the furnace from all the points of the wall, and the molten metal is prevented from filling up the tuyeres.

The invention consists of certain parts and details, and combinations of the same, as will be hereinafter described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a sectional plan view of the same on the line 2—2 of Fig. 1. Fig. 3 is a side elevation of the tuyere. Fig. 4 is a sectional side elevation of the same on the line 4—4 of Fig. 2; and Fig. 5 is a transverse section of the improvement on the line 5—5 of Fig. 1.

The cupola furnace is provided with the usual stack A in the lower part of which is arranged a circular tuyere B surrounded at the outside by an air chamber C, formed by the enlarged part D of the shell for the stack. Into this air chamber C discharges the pipe E connected with the usual air blast, so that the air entering the said chamber C can pass through the openings in the circular tuyere B to the interior of the stack A.

The circular tuyere B is preferably made of two parts, a top plate B′ and a bottom plate B^2, both made ring-shaped, the top plate being provided at its beveled under side B^3 with depending radially arranged arms B^4 resting with their lower V-shaped edges on a correspondingly-shaped double bevel B^5 forming the top surface of the lower ring plate B^2. By this arrangement a series of tuyere openings B^6 are formed in the tuyere, and connecting the air chamber C with the interior of the stack A, the said openings being each somewhat contracted near the middle to retard the air blast at this point, so as to give it with the back pressure, more force to reach the center of the furnace. In the bottom plate B^2 of the tuyere are also formed at opposite sides the transversely-extending pockets B^7, leading to passages F in the bottom of the air chamber C, the said pockets extending through the shell to the outside, so that any molten metal reaching up to the bottom plate B^2 can pass through the said pockets B^7 to the outside, to prevent the molten metal from entering the openings B^6 in the tuyere. By having the top surface B^5 of the bottom plate B^2 made in the shape of a double bevel forming an obtuse angle, as illustrated in Figs. 4 and 5, the molten metal is not likely to pass beyond the apex of the said bevel, whereby the flow of the molten metal into the air chamber C is prevented.

In the shell D are arranged port holes G which permit of examining the interior workings of the furnace whenever desired, the said port holes being arranged in alignment with corresponding openings B^6 in the tuyere B. From the air chamber C extends upwardly a series of pipes H arranged on the outside of the stack and passing through the shell of the latter to the interior of the furnace, a suitable distance below the charging doors J, as plainly indicated in Figs. 1 and 5. Each of the said pipes H is provided near its lower end with a valve I for regulating the amount of air passing from the air chamber C through the said pipes H into the upper part of the stack. The air used or permitted to pass through the said pipes H, is surplus air not passing through the tuyere openings B^6 to the interior of the furnace, and this air discharged into the upper part of the stack serves to assist in the combustion of the charge in the furnace. It will be also seen that, by locating the point of discharge below the doors J, the latter are prevented from becoming overheated.

I prefer to make the depending arms B^4 of the tuyere B larger on the inside than on the outside, as plainly indicated in Fig. 2, to permit the air to readily enter the openings B^6 formed by the said arms, as will be readily understood by reference to said Fig. 2.

By the arrangement described, the air blast can readily pass to the center of the furnace

from all points of the wall, so that an equal combustion takes place in the entire stack, and a uniform and strong iron is produced. Different grades of iron are also better mixed by this arrangement. By assisting the combustion in the upper part of the stack through the introduction of air through pipes H, I considerably reduce the time usually necessary for producing molten metal in the furnace.

The pipes H which extend up and around the main stack are provided with valves I to regulate the blast when applied to the air chamber and through the tuyeres; this avoids a cut-off in the main pipes. When the cupola is melting too fast the valves I at the base of those pipes H are opened; this lets the blast up the pipes and, entering through the stack and wall, it forms a combustion at a point a little below the charging door J; and when coke and iron pass down to the melting point they are in such a heated condition that the heat evolves more rapidly and they utilize or condense the large amount of heat at those points, which would otherwise pass up the stack. By this improvement a great amount of fuel is saved.

The convex portion in the center of the bottom ring of tuyeres prevents the molten metal from ever remaining on it to be congealed by the action of the blast, and the back bevel on the inside face of the tuyeres also prevents the iron from coming in contact at any point with the tuyeres, and in case the iron is allowed to run up in the cupola to pour a large casting, the two passages in the tuyeres one on each side and the two pockets on the bottom of the air chamber, corresponding with pockets in the tuyeres, are to carry off the overflow iron. The ports on the outside of the air chamber are for the purpose of giving vent to the fire when started or to look through when the cupola is in action.

It is to be understood, that the lower ends of passages, F, are to be temporarily closed with clays plugs (as shown by dotted lines Fig. 5), when the furnace is in active operation.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The cupola furnace having radial tuyere openings which gradually increase in width from the inside to outside, and whose bottoms are obtuse-angled, as and for the purpose specified.

2. In a cupola furnace, the combination, with the stack having a series of radial tuyere openings and the pockets, B^7, arranged transversely of a surrounding air-blast chamber, C, whose bottom is provided with vertical passages, F, substantially as and for the purpose specified.

3. A cupola furnace provided with a tuyere made circular and formed with radial openings, and pockets arranged in the bottom of the said tuyere below the said openings, substantially as shown and described.

JAMES BLAKENEY.

Witnesses:
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O. B. TROUT.