

V. COLLIAU.
Cupola-Furnace.

No. 197,605.

Patented Nov. 27, 1877.

Fig. 1.

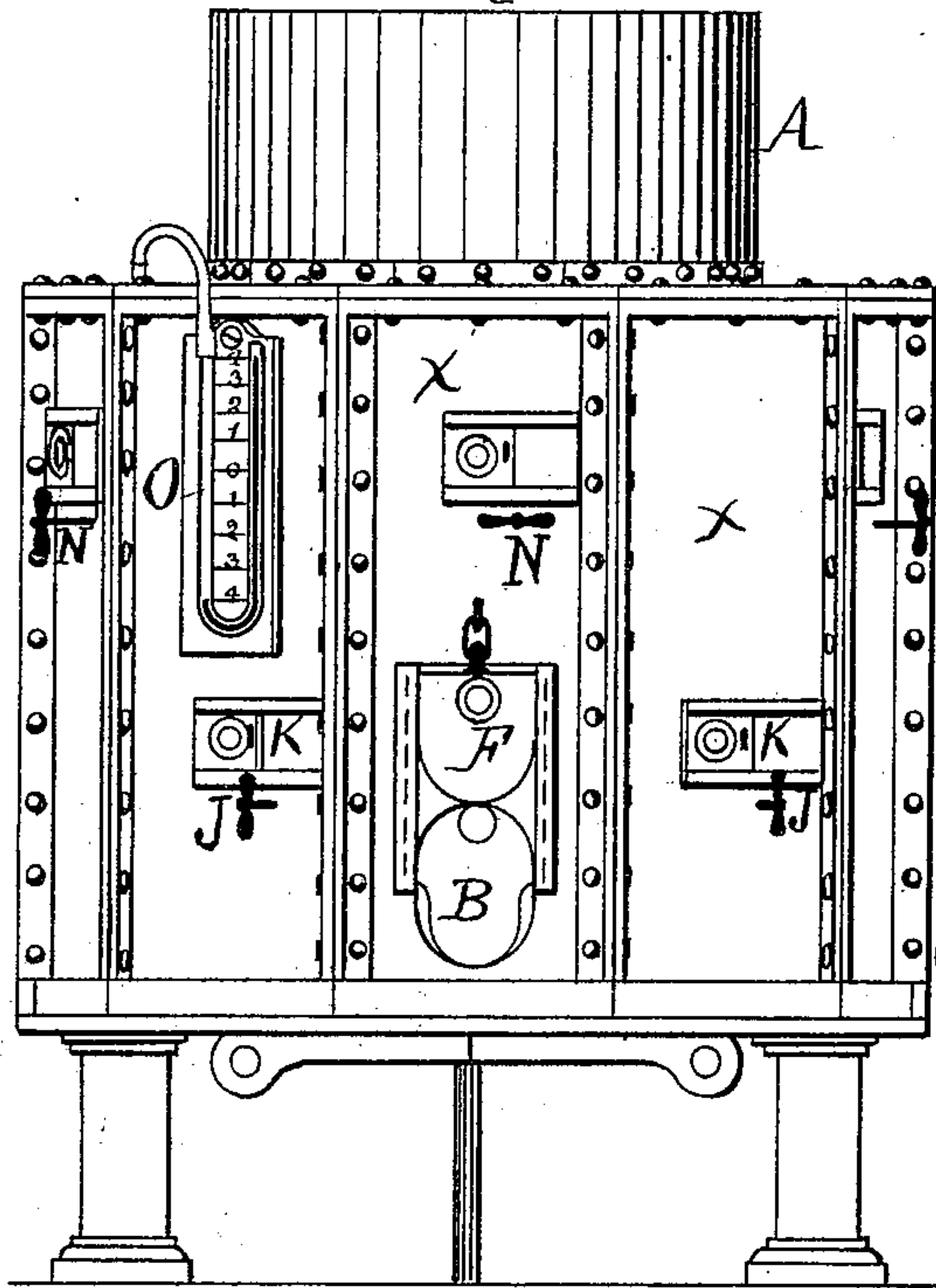


Fig. 2.

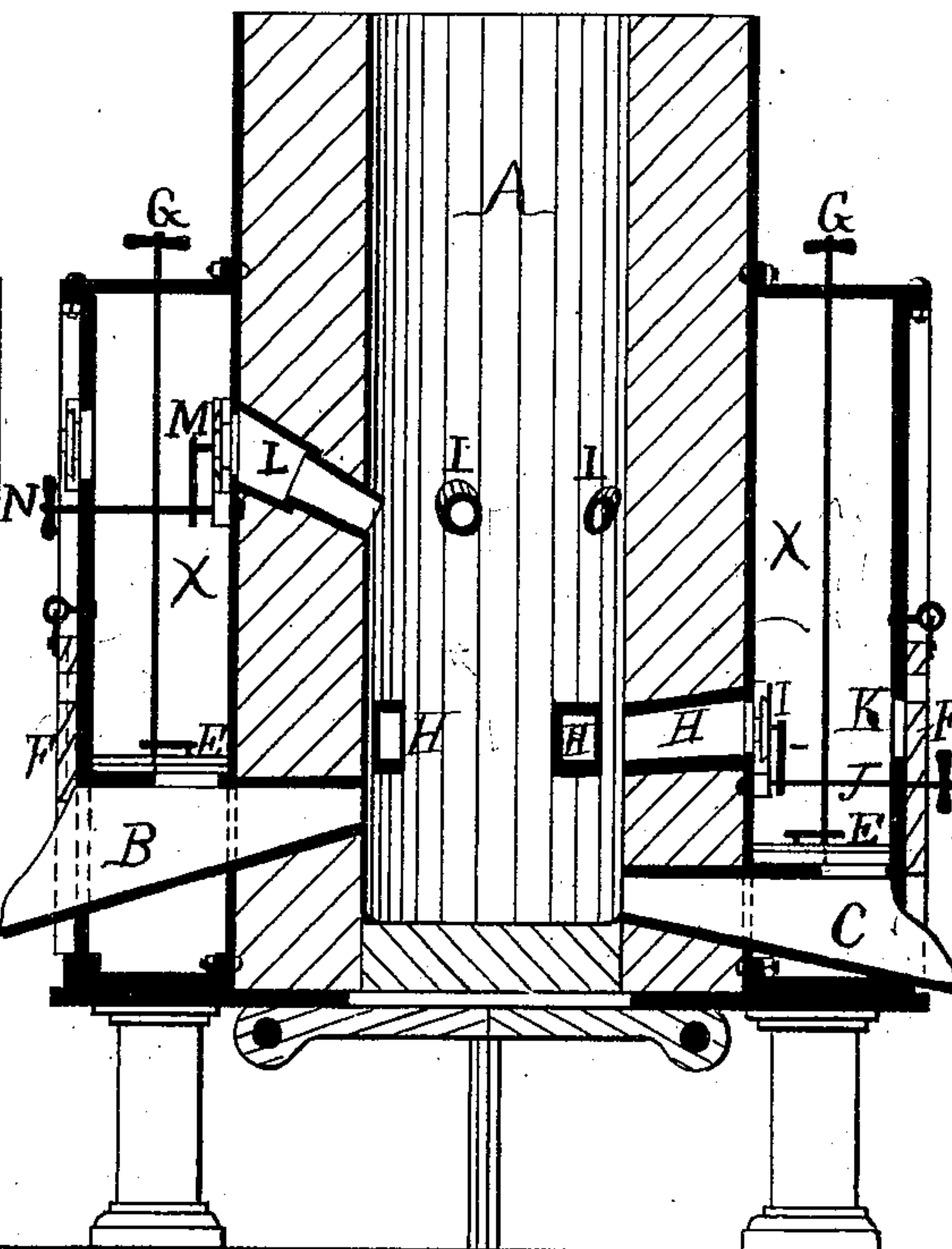


Fig. 3.

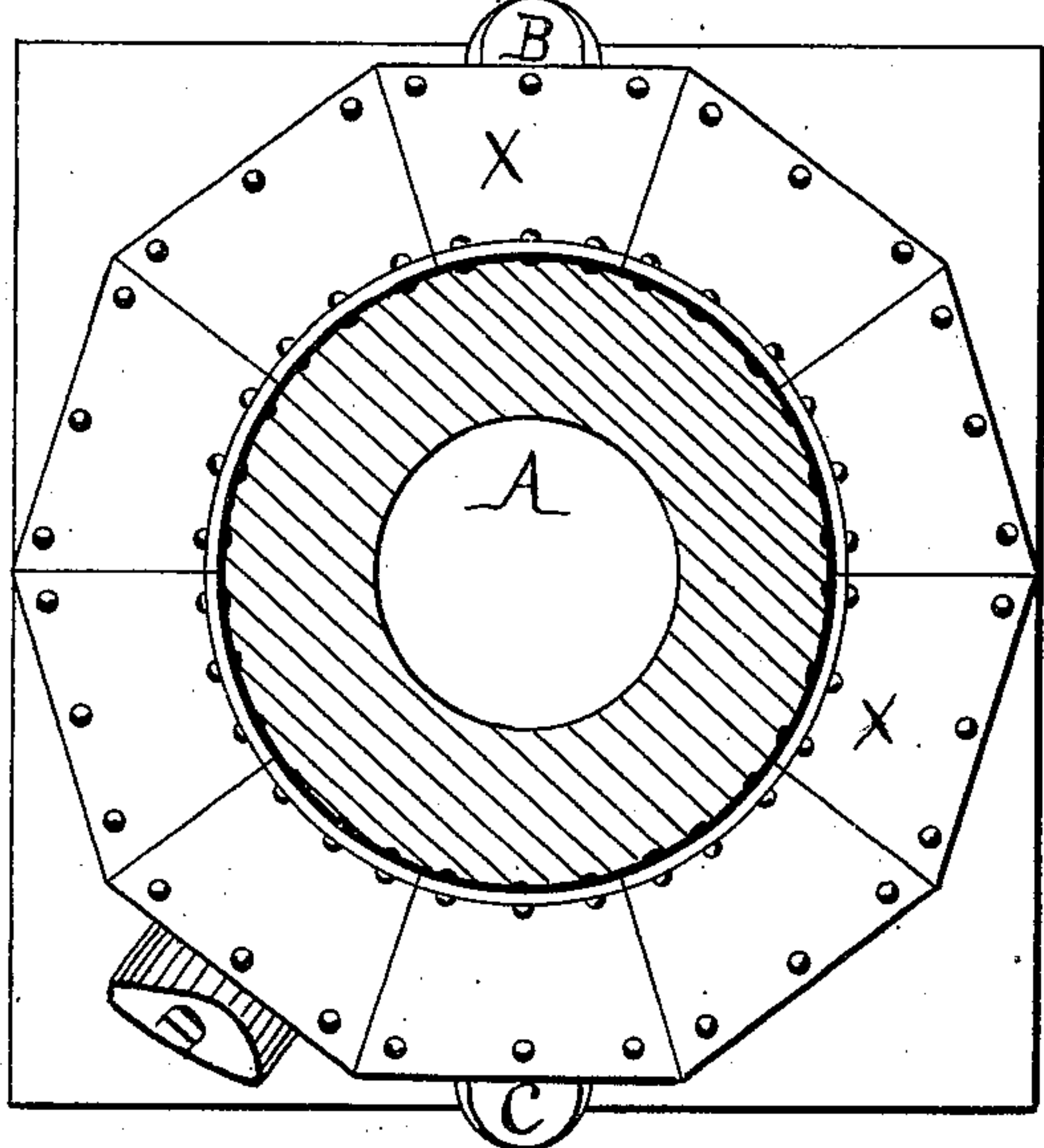
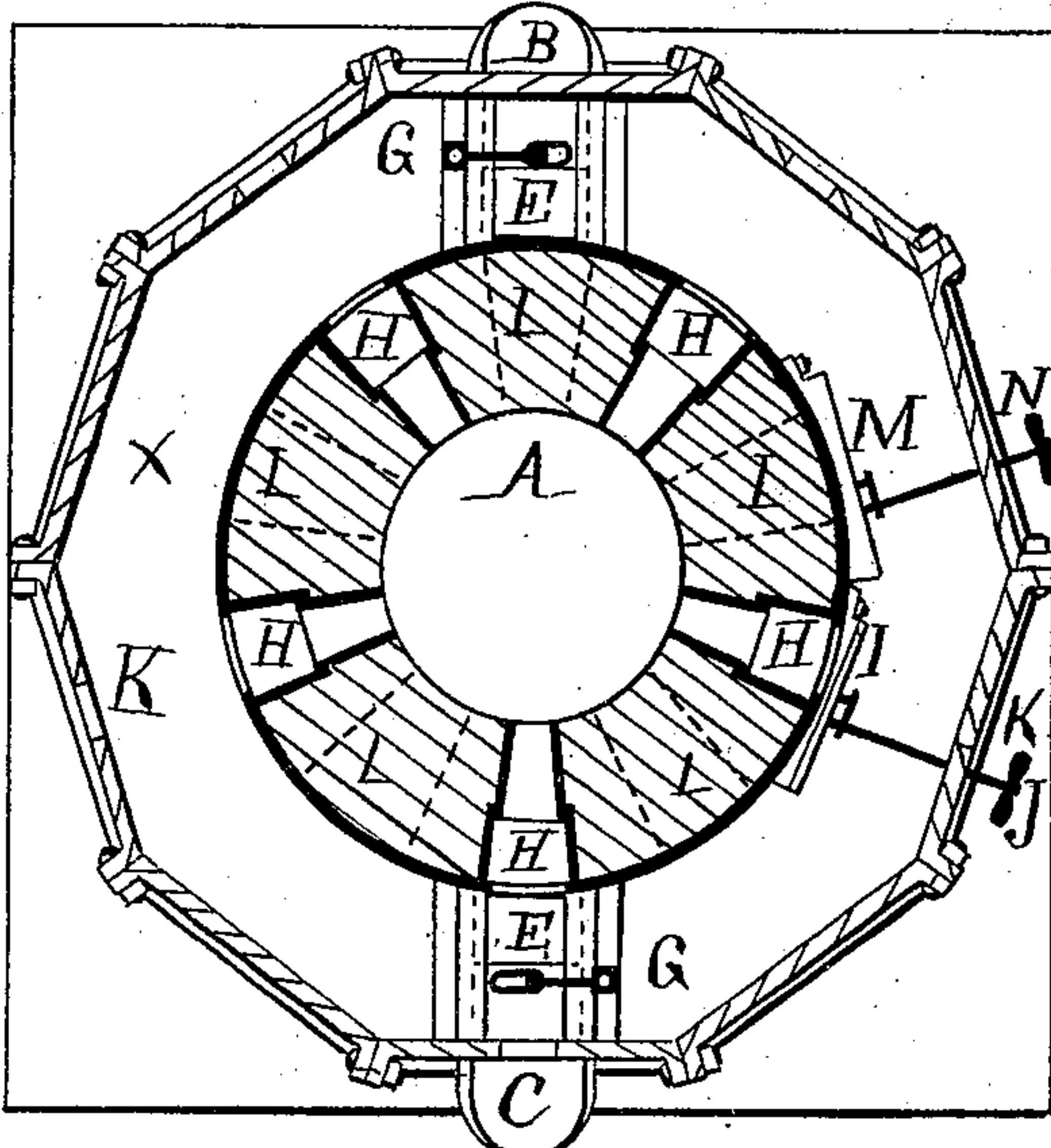


Fig. 4.



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UNITED STATES PATENT OFFICE.

VICTOR COLLIAU, OF DETROIT, MICHIGAN.

IMPROVEMENT IN CUPOLA-FURNACES.

Specification forming part of Letters Patent No. **197,605**, dated November 27, 1877; application filed May 26, 1877.

To all whom it may concern:

Be it known that I, VICTOR COLLIAU, of Detroit, in the county of Wayne and State of Michigan, have invented an Improvement in Cupola-Furnaces, of which the following is a specification:

My invention has relation to certain improvements in cupola-furnaces of that class which are provided with two sets of tuyeres, one above the other, both sets communicating with, and delivering the blast from, an annular air-chamber encircling the base of the cupola; and it consists, first, in providing the tap and slag holes with valves, whereby they can be used as tuyeres in the preliminary firing of the furnace; and, further, in the construction and arrangement of the tuyere-valves, and in the means for opening and closing them independently from the outside of the air-chamber.

Figure 1 is a front elevation. Fig. 2 is a central vertical section on the line of the tap and slag holes. Fig. 3 is a plan or top view. Fig. 4 is a horizontal section through the central set of tuyeres.

In the drawing, A represents an ordinary cylindrical cupola-furnace, whose base is inclosed by an air-chamber, X, composed of plates or staves of cast-iron, bolted together in such manner that said chamber can be adapted to any shape or form of furnace. By this sectional construction any part can be removed to give access to the cupola, the tuyeres, and their valves, to quickly make any required repairs. This air-chamber, covering all the tuyeres, is a blast-reservoir for them all, and is connected with the blower by a pipe, D, Fig. 3, the blast being distributed in the furnace by three different systems of tuyeres.

The first system comprises the tap-hole C and slag-hole B, which become such by closing the gates F on their outer ends and opening a valve, E, with which each is provided, communication being thus opened with the blast-reservoir. In the first stage of the operation the blast is employed for the twofold purpose of lighting the fire and giving an increased temperature to the bottom of the furnace, which then will not cool the first iron that comes down.

The valves E E are each operated by a le-

ver, G, whose stem passes up through the top of the air-chamber. These openings may also be used as tuyeres during the melting operation should the cupola, by any means, cool, and a greater blast be required at the bottom of the furnace.

The second system of tuyeres are the ordinary ones, H, which may vary in size and number, according to the quantity of metal to be melted and the size of the cupola. They are in communication with the blast-chamber through slides I, which are moved by lever-spindles J, extending through the wall of the chamber. Each slide has a piece of mica inserted in it, through which the interior of the furnace can be viewed when the slide is closed to shut off the blast from the tuyere, a similar piece of mica being inserted in a slide, K, in the casing, directly opposite each slide I.

The third system of tuyeres are arranged above the tuyeres H, as indicated at L, being smaller in sectional area than the latter, and arranged to alternate with them. They have an inclination downward proportionate to the diameter of the furnace, in such manner that the blast from them will reach the focus of combustion produced by the second or ordinary tuyeres. They communicate with the air-chamber through slides M, like the others, opposite each of which is an illuminated slide, N, in the casing. O is a water-gage to indicate the pressure of the blast.

Immediately after lighting the fire, the tap and slag holes only are used as tuyeres; the upper ones being shut off and the blast applied. As soon as the fire is well ignited, as seen through the mica windows opposite the tuyeres H, the latter are to be opened.

The bed of fuel being completed, the charging of the metal is commenced. As soon as molten iron appears at the tap-hole C, the valves E of the tap and slag holes are closed. Their gates F must then be raised and the holes stopped with clay. The operation proceeds then in the usual manner, the slag being drawn off as may become necessary.

When the operation of loading the iron is completed, and the last load falls to within two feet of the upper tuyeres, they are to be closed and remain so until the heat is off and the bottom doors opened.

Should any of the tuyeres be, at any time, obstructed from slag or iron, it must be closed until the obstruction melts away, when it can be reopened.

Should the bottom of the cupola accidentally chill during the heat, the clay must be removed from the slag-hole B, to permit the gate to be closed and the air-valve opened, in order that the blast may be applied to the bottom of the cupola.

My object in inclining the upper tuyeres is to concentrate the fire in the smallest possible compass, so that the metal in fusion will have less space to traverse while exposed to the oxidizing influence of the blast, thereby insuring tougher castings, and also perfect combustion of the inflammable gases, (with corresponding economy in fuel,) contrary to the usual practice of spreading the blast as much as possible.

In the practical use of this cupola there is no fire to be seen at the loading-doors, and no throwing off of combustible gases, carbonic-acid gas alone escaping, the top of the cupola being as cool as if there were no fire below.

What I claim as my invention is—

1. A cupola-furnace in which are combined

a furnace proper, A, an inclosing iron jacket around the base of the same, constructed in stave sections, and bolted together, so that one or more sections may be removed conveniently, an air-blast reservoir between said jacket and the base of the furnace proper, A, a blast-pipe entering said air-blast reservoir, and systems of tuyeres with regulating-valves leading from such air-blast reservoir into said furnace proper, the several parts constructed and arranged substantially as and for the purposes set forth.

2. The valves E and gates F, in combination with an air-chamber inclosing the base of a cupola-furnace, whereby its tap and slag holes can be used as tuyeres, substantially as described.

3. The combination, with the tuyeres H L, of the slides I M, and the lever-spindles operating the same, the several parts constructed and arranged substantially as and for the purposes described.

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Witnesses:

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