G. F. DOWNS AND H. F. MILLER, JR.

PORT CONSTRUCTION FOR METALLURGICAL FURNACES.

APPLICATION FILED MAY 15, 1919.

1,343,315. **Patented June 15, 1920.**

2 SHEETS—SHEET 1.

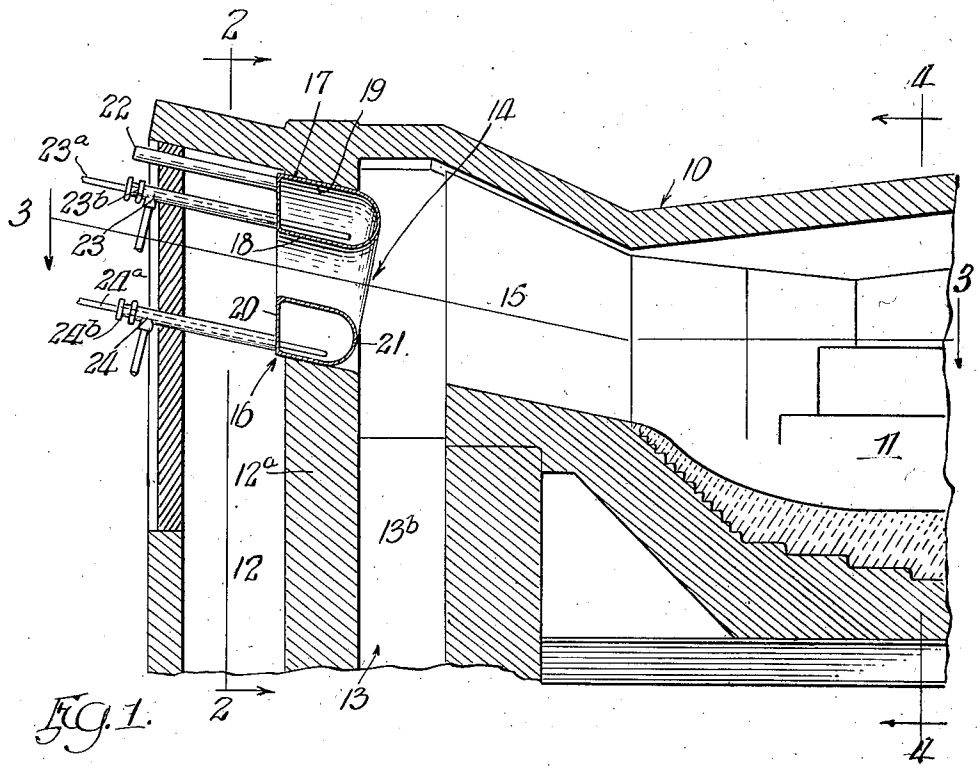


FIG. 1.

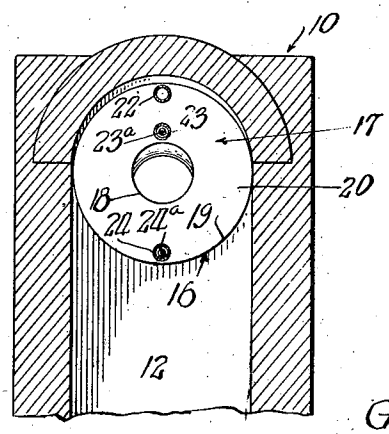


FIG. 2.

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2 SHEETS—SHEET 2.

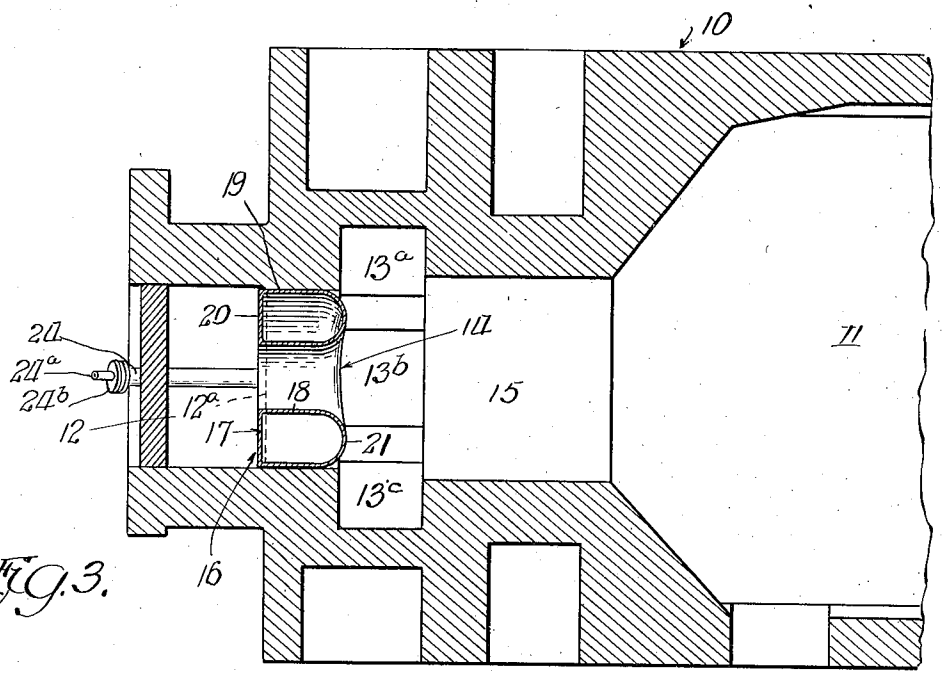


FIG. 3.

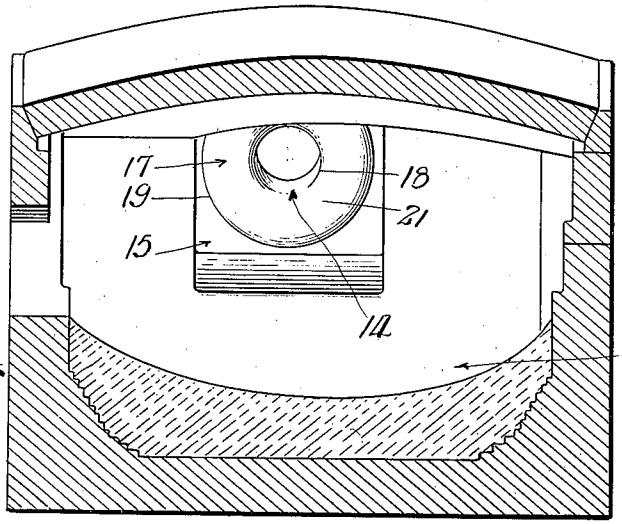


FIG. 4.

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UNITED STATES PATENT OFFICE.

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PORT CONSTRUCTION FOR METALLURGICAL FURNACES.

1,343,315. Specification of Letters Patent. Patented June 15, 1920.

Application filed May 15, 1919. Serial No. 297,362.

To all whom it may concern:

Be it known that we, GEORGE F. DOWNS and HERBERT F. MILLER, Jr., citizens of the United States, and residents of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Port Construction for Metallurgical Furnaces; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel and useful improvement in the port construction of metallurgical furnaces and consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The invention is addressed to improvements in the type of port construction described in our application for patent, filed March 30, 1918, Serial Number 225,647.

The object of the present invention is to provide a construction by means of which a thorough and complete intermixture of the air with the gas will be produced before the gas reaches the hearth, so as to start combustion at the earliest possible instant, on the inside of the gas volume as well as on the outside thereof, thereby producing a maximum of intense heat when the burning mixture reaches the hearth.

The advantage of such early and complete combustion of the gas is that first the furnace is made capable of greater production in a given length of time; and secondly, a reduction of the dimensions of the walls of the port is made possible, thus greatly conserving the expensive refractory material in building as well as reducing the wearing surface of the walls and increasing the life of the furnace.

The advantages of the invention will appear as we proceed with the specification.

In the drawings:

Figure 1 is a view representing in longitudinal section, one end of an open hearth furnace provided with our improvements.

Fig. 2 is a view representing a vertical section through the parts shown in Fig. 1, in a plane indicated by the line 2—2 of said figure.

Fig. 3 is a view representing a horizontal section through the parts of the furnace shown in Fig. 1 in a plane indicated by the line 3—3 of Fig. 1.

Fig. 4 is a view representing a vertical, transverse sectional view in a plane indicated by the line 4—4 of Fig. 1.

The construction in the drawings shows the application of our invention to a well-known type of open hearth furnace. Referring now to that embodiment of the invention illustrated:—10 indicates, as a whole, an open hearth furnace, and 11, the furnace chamber. 12 indicates the gas uptake; 13 indicates the air uptake, said uptake in this case having three vertical branches 13^a, 13^b and 13^c; 14 indicates the gas port; and 15, the air port.

16 indicates a gas flue, the inner orifice end providing the gas port 14. Said gas flue is made of metal and is generally of the type shown in the application of George F. Downs filed March 5, 1918, Serial Number 220,454. It consists specifically of a hollow, annular shell 17 comprising concentrically arranged, radially spaced, tubular members,—namely: an outer member 19, and an inner member 18,—and end members 20, 21, the end member 20 being the one next adjacent to the gas uptake and the end member 21 being the one nearest the hearth.

The flue shell 17 is positioned with its outer end extending into the gas uptake, while its inner end is extended to or into the air port,—the axis of the shell being inclined downwardly to direct the fuel down upon the hearth. The inner end of the metal shell providing the flue, does not extend across the upper end of the air uptake or uptakes, as in the case of the specific construction shown in our application hereinbefore referred to, but terminates at a point intermediate the gas uptake and the near end of the wall defining the bottom of the air port. In the particular case illustrated herein, said flue merely projects a short distance into the air uptake.

The object of the construction thus described, is to so arrange the gas flue that when gas issues from the orifice or port end 14 of said flue, the body of gas will not only be surrounded by the air in the air port, as in our previous construction, but in addition said gas body will flow across the path of the current of hot air coming up through the air uptake or uptakes. The result of this arrangement is to produce a thorough and complete mixture of the air with the gas at the port orifice of the flue, not only about the outer periphery of the body of gas issuing from the gas port, but also with the gas in the interior of said body, this intermixture being brought about by the well-known action of two currents of fluid which intersect at an angle. The impingement of the two currents, the one upon the other, produces a thorough intermingling of the component parts of the two currents so as to thoroughly intermingle and mix them.

The flue 16 is supported in the desired position in any convenient manner, either by the walls of the furnace construction or independently thereof. In the specific construction illustrated, the flue is supported directly in the upright wall 12^a of the furnace.

The flue is water cooled as heretofore, cooling water being led thereto from a source of supply not shown, and being discharged therefrom in a familiar manner by means of pipes 22, 23 and 24. These pipes may, any one of them, be an inlet, and the others discharge pipes. In order to remove the sediment therefrom, and to have it carried off with the cooling water as it is discharged, we provide agitator devices 23^a, 24^a, which extend through stuffing boxes 23^b, 24^b into the pipes 23, 24, in such manner as to be capable of a longitudinal reciprocation.

The plane of the orifice 14 of the gas flue, as shown in the drawings, is not in the plane of the inside of the end wall of the air port, but is at right angles to the center line of the gas flue. By this arrangement, a better control of the gas flame is obtained and a better and cheaper method of manufacture, than could have been obtained with a port,—the plane of whose orifice lay in the plane of said inside face of the wall of the air uptake or in a plane parallel thereto.

While in describing and illustrating our invention, we have referred to certain details of mechanical construction and arrangement, it is to be understood that the invention is in no way limited thereto, except as may be pointed out in the appended claims.

We claim as our invention:

1. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, a gas flue connecting the gas uptake with the interior of the air port, said gas flue being positioned to discharge across and at an angle to the upward path of the air coming through the air uptake.

2. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, a gas flue connecting the gas uptake with the interior of the air port, said gas flue having its port end terminating at a point in the plane of and above the air uptake.

3. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, a gas flue connecting the gas uptake with the interior of the air port, said flue being positioned to discharge gas across and at an angle to the updraft of air in the air uptake so that as the body of gas issues from the port end of the flue it will be entirely surrounded by and will be intermingled with the air rising through the air uptake.

4. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, a tubular gas flue extending into said air port to connect the gas uptake with the interior of the air port, said flue terminating at a point above the air uptake and short of the wall defining the bottom of the air port, and means supporting said gas flue so that gas discharged from said gas flue is completely surrounded by the air in said air port and is directed at an angle across the path of the air rising through said air uptake.

5. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, means providing a tubular gas flue, to connect the gas uptake with the interior of the air port, said flue terminating at a point above the air uptake and short of the wall defining the bottom of the air port, and means supporting said gas flue so that gas discharged from said gas flue is completely surrounded by the air in said air port and is directed at an angle across the path of the air rising through said air uptake.

6. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, a metal gas flue connecting the gas uptake with the interior of the air port, said gas flue having its port end terminating at a point above the air uptake but short of the wall defining the bottom of the air port so that the gas issuing from the gas port will be entirely surrounded by air as the gas flows through the air port to the furnace hearth.

7. In a furnace of the kind described, in combination with the furnace walls defining gas and air uptakes and an air port, means providing a gas flue for connecting the gas uptake with the interior of the air port, said gas flue being positioned to discharge gas across and at an angle to the updraft of air

in the air uptake and having the lowest point of its orifice above the wall defining the bottom of the air port, the port end of said flue being arranged in a plane perpendicular to its longitudinal central axis.

In testimony that we claim the foregoing as our invention, we affix our signatures, in the presence of two witnesses, this 12th day of May, A. D. 1919.

GEORGE F. DOWNS.
HERBERT F. MILLER, JR.

Witnesses:
JULE WUNSCH,
W. J. BRYAN.