

F. W. LURMANN.

Blast Furnace.

70,447.

Patented Nov. 5, 1867.

Fig. 1,

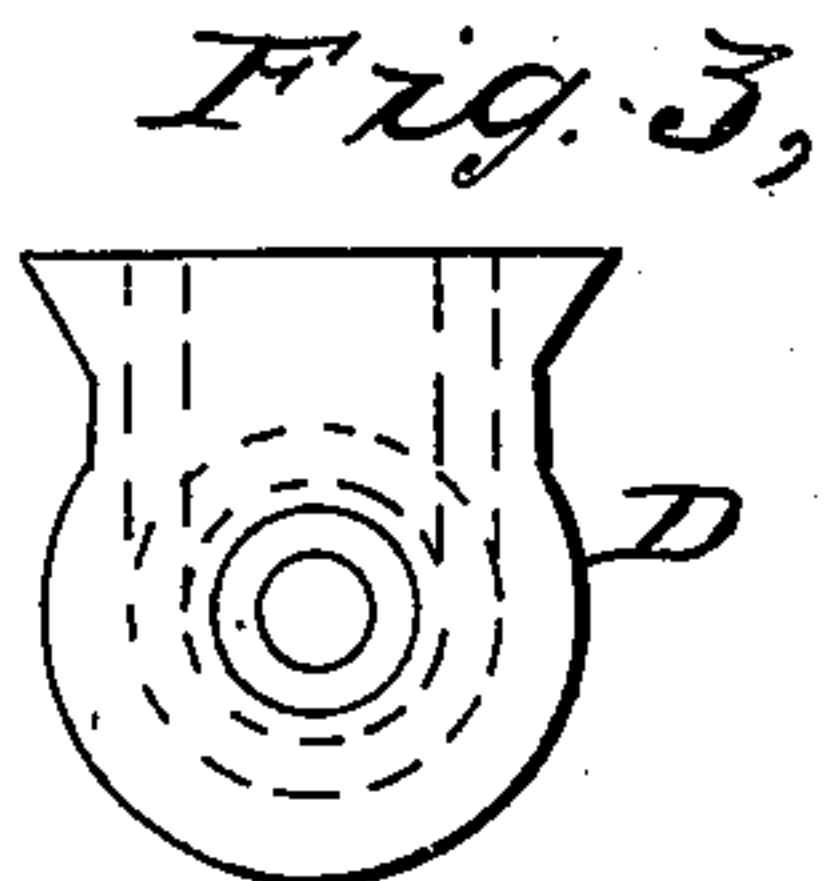


Fig. 4,

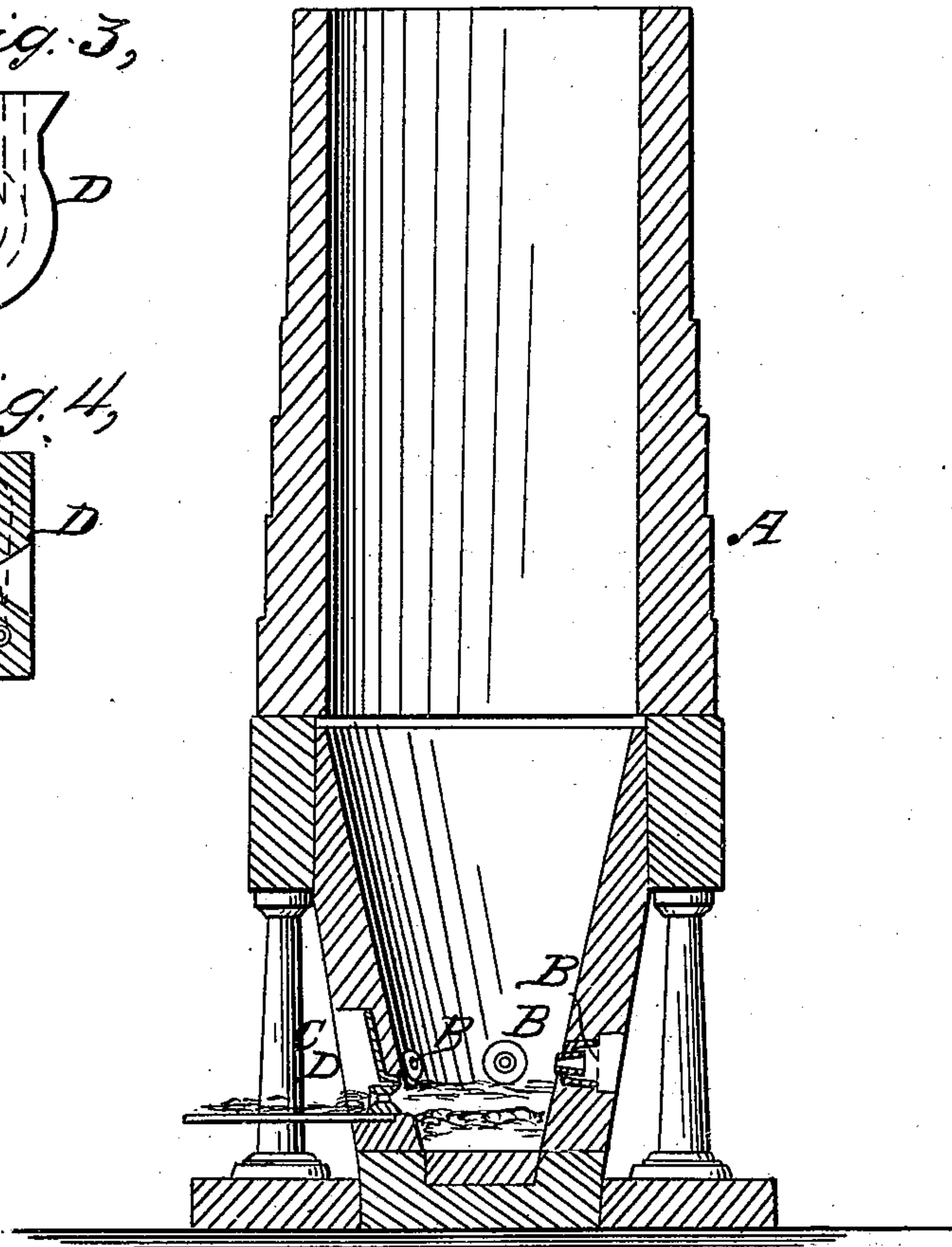
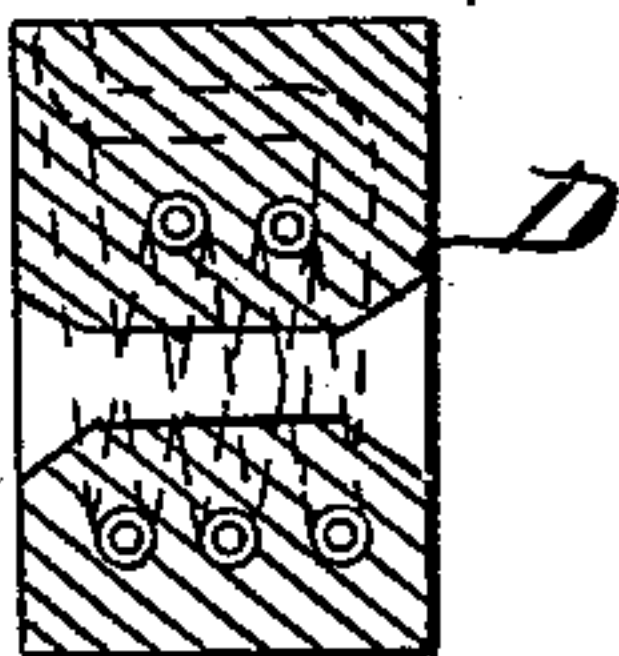
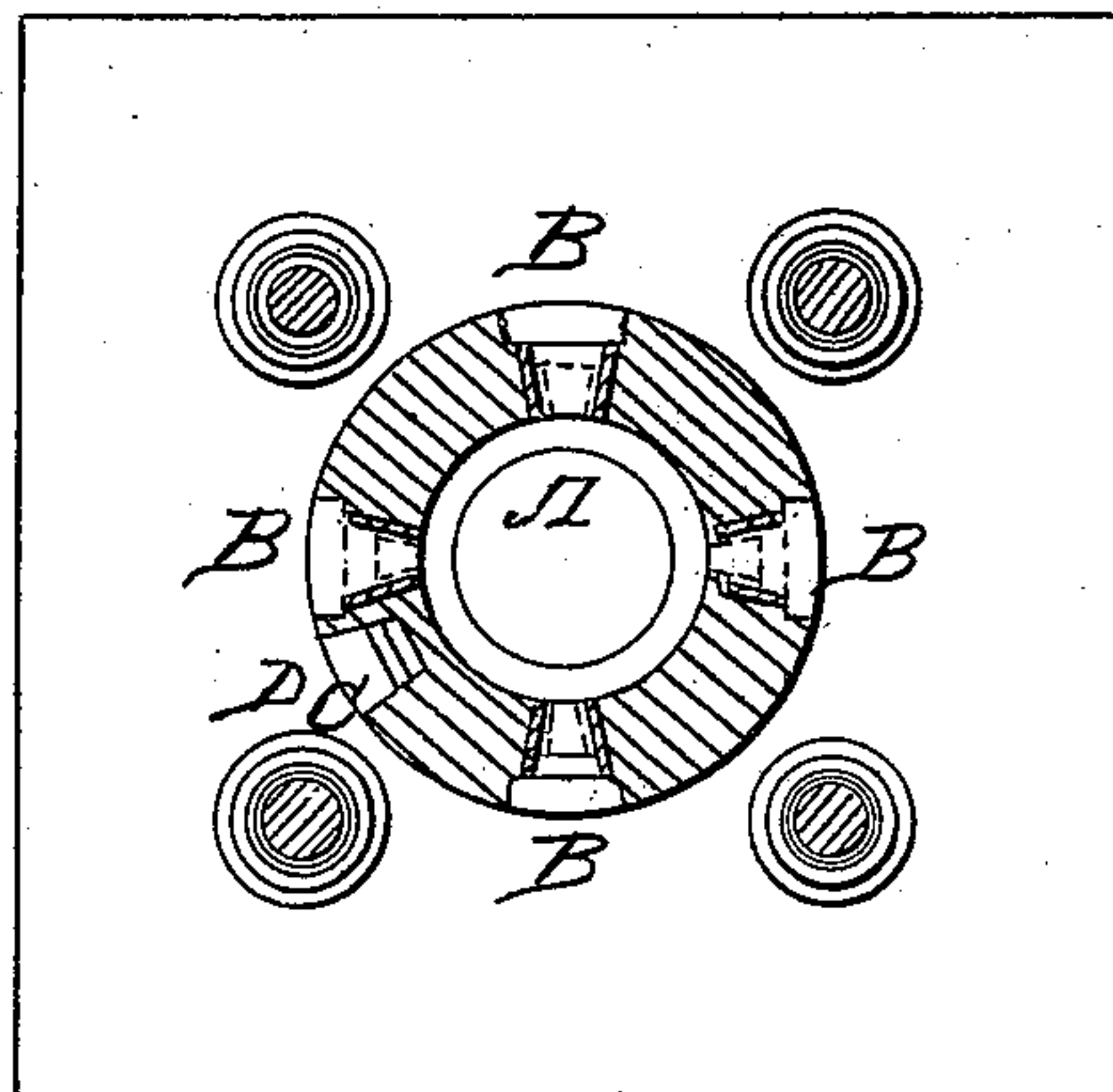


Fig. 2,



Witnesses:
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F. W. LÜRMANN, OF OSNABRUCK, PRUSSIA.

Letters Patent No. 70,447, dated November 5, 1867.

IMPROVEMENT IN BLAST-FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, F. W. LÜRMANN, of Osnabruck, in the Kingdom of Prussia, have invented a new and useful Improvement in Blast-Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 is a vertical central section of a furnace to which my improvement is applied.

Figure 2 is a horizontal section through the tuyeres.

Figure 3 is a front elevation of the slag-discharge piece detached.

Figure 4 is a vertical section of the latter, also detached.

This invention relates to furnaces for smelting iron ore, and has for its object to dispense with the "t ymp" or fore-hearth and the "wall-stone" now in common use in iron blast-furnaces, and to replace the t ymp arrangement by such a construction as allows the slag to be tapped directly from the hearth. In the t ymp arrangement the slag is driven out of the furnace by being first forced below the t ymp-stone, which projects below the level of the tuyeres and intercepts the currents of air, and prevents their escape with the slag, which stands in the t ymp at the same level as on the hearth, the slag being discharged only when it rises in the t ymp high enough to overflow the top of the wall-stone that forms the bottom of the discharging orifice. By this arrangement the t ymp-stone constitutes a trap which intercepts the currents of air, and causes their pressure to be exerted directly on the surface of the slag on the hearth. This method of construction has several disadvantages, one of which is the difficulty of keeping the t ymp-stone and the surrounding parts in repair; another is, that the pressure of the currents of air or wind is limited and counteracted by the counter-pressure of the column of slag in the t ymp; and another is, that one side of the furnace being occupied by the t ymp, no tuyere can be applied on that side, and consequently the supply of wind is irregularly distributed.

My invention avoids or overcomes these disadvantages in a simple and effective manner.

In this example of my invention the letter A designates the furnace, and B several tuyeres, which are arranged therein at a proper height. My furnace has no t ymp, and the sides of the hearth, whether round or square, extend clear down to the bottom stone, the usual opening (not shown in the drawing) being made in the lower part of the hearth, for the discharge of the iron. The openings of or the tuyeres B are distributed at equal distances apart in the sides of the hearth. At a suitable height from the bottom-stone I leave an opening in the hearth, in which I place a cast-iron or brass slag-discharge piece, D, which is cast or made with numerous channels or pipes, running up and down or in other directions through it, as shown in figs. 3 and 4. The piece D is formed with a dove-tail on its upper end, which is fitted into the bottom of a stationary metallic plate, C, connected with the furnace. This plate is also cast or made with channels or pipes running through it, and the channels or pipes of said plate and of the piece D may be so arranged as to connect or communicate with each other when the plate C and piece D are in their proper positions, or they may be independent of each other. The object of the said channels or pipes is to permit the plate C and piece D to be cooled, by forcing water through them while the furnace is in operation, proper connections being made for that purpose with a reservoir of cold water, or with a force-pump. One or more holes are made in said piece D, through which the slag is discharged, the shape of said holes being shown in figs. 3 and 4, the middle portion being cylindrical, but each end being conical or flaring. The dimensions of the slag-discharge piece are a little less than the opening in which it is placed, and the space left around it is filled with sand, which can be readily removed in case it is desired to remove the piece D to repair it, or if it is desired to have an opening in the hearth to work through, as when any irregularity in the smelting process has taken place. The flow of cooling-water through the slag-discharge piece D is regulated for the purpose of controlling the discharge of the slag through it. By allowing much cooling water to circulate through its water-channels or pipes, the temperature of the piece D is lowered sufficiently to allow a coating of slag to adhere and choke its discharge openings, which are of less diameter in the middle than at their ends. By reducing the flow of cooling-water the piece is allowed to retain a higher temperature, and in consequence the slag is melted out of the discharge-openings, and they become clear and open, and permit the slag to flow without interruption. When the slag in the hearth is lower than the level of the discharge-openings, the latter are simply closed by an iron rod.

My invention can be easily applied, by those skilled in the art to which it belongs, to blast-furnaces of the common construction.

The invention is attended with several advantages over the common method of constructing or arranging furnaces, among which I mention the following:

First. It permits a higher pressure of wind.

Second. The hearth is preserved in better condition than where the common mode of construction is retained.

Third. The labor of the operation of smelting is lessened.

Fourth. It allows one more side of the hearth for a tuyere.

Fifth. It avoids the stoppages of the wind supply, now necessary as often as the iron is discharged.

Sixth. A considerable increase is gained in the product of the furnace, while at the same time the cost of labor and repairs is lessened.

What I claim as new, and desire to secure by Letters Patent, is—

1. The slag-discharge piece D, constructed and arranged substantially as described.

2. The slag-discharge piece D, in combination with the plate C, to which it is fitted substantially as described.

3. The shape of the discharge-opening or openings of the piece D, being made flaring at its ends, and of diminished diameter in the middle or central part, substantially as described.

4. Combining with the slag-discharge piece a series of water-channels or pipes, substantially as and for the purpose above set forth.

5. Combining with the metallic plate C a series of water-channels or pipes, substantially as and for the purpose above set forth.

6. The method of controlling the discharge of slag from blast-furnaces, by regulating the temperature of the slag-discharge piece, substantially as described.

This specification signed by me this twelfth day of July, 1867.

F. W. LÜRMANN.

Witnesses:

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E. SCHEMMANN.