No. 754,337. PATENTED MAR. 8, 1904.

J. W. PACK.

BLAST FURNACE.

APPLICATION FILED OCT. 28, 1903.

NO MODEL.

Fig. 1.

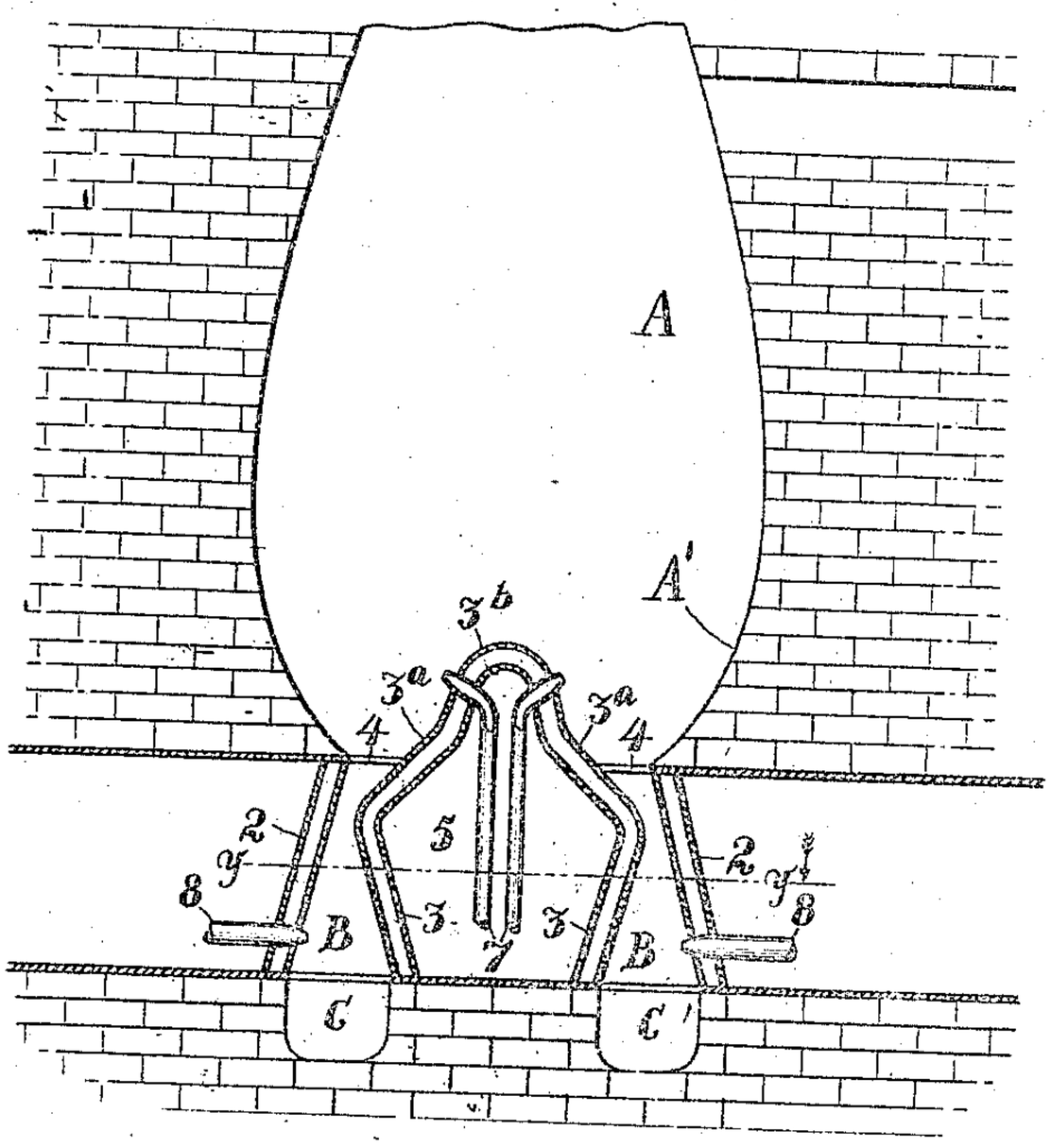
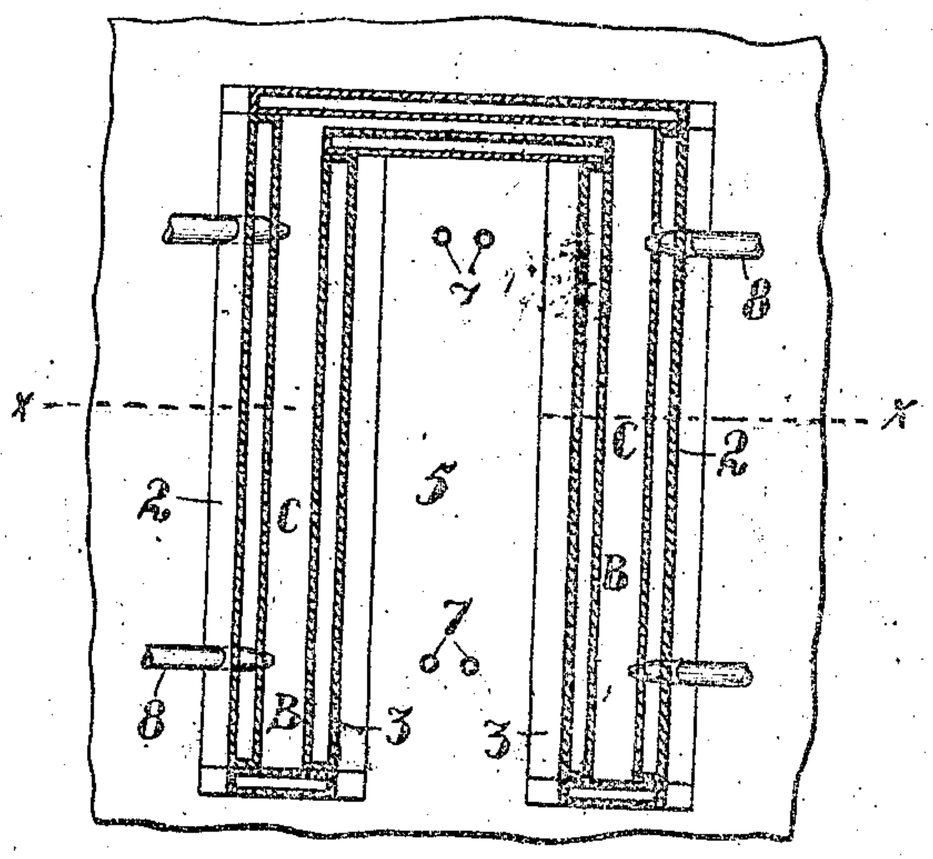


Fig. 2.



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No. 754,337. Patented March 8, 1904.

UNITED STATES PATENT OFFICE.

JOHN W. PACK, OF BERKELEY, CALIFORNIA.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 754,337, dated March 8, 1904.

Application filed October 28, 1903. Serial No. 178,808. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. PACK, a citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Blast-Furnaces, of which the following is a specification.

My invention relates to improvements in furnaces, such as smelting or blast furnaces or the like.

It consists in a novel construction of the furnace with exterior and interior water-jackets, and said interior jacket is of such shape as to form an inner chamber through which communication may be had to make connection for burners where oil is to be used.

My invention also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section taken through *x x* of Fig. 2. Fig. 2 is a section taken on line *y y* of Fig. 1.

I have here shown a furnace of any usual or suitable interior construction. It may be made of brick or such other material as is employed for this class of furnaces. It comprises a vertical stack A, into the upper part of which the ore and coke for fuel may be introduced. The lower part converges in the usual manner, as at A′, and opens into the spaces shown at B, at the bottom of which is located crucibles C. Surrounding the space B is a water-jacket, as at 2, and within the chamber B and projecting up through the boshes or narrow part at the lower end of the stack is an interior water-jacket 3. This jacket, as here shown, is made in vertical section with the lower part 3 diverging to a point just below the narrow portion between the parts A′ and B of the furnace. From this point the upper portion converges, as shown at 3^a, and the top is arched, as shown at 3^b. The angle or widest part between 3 and 3^a is just below the narrow part 4 of the furnace, so that ore and material which are converged down the sides A′ of the lower part of the furnace will rest against the sides 3^a of the upper part of this water-jacket, and as the ore is reduced it will gradually fall through this narrow portion into the part B, and the molten metal will pass into the crucible C. Suitable tap-holes for the metal and the slag are made in the usual manner. As described above, Fig. 1 is a vertical section taken through *x x* of Fig. 2. A section of the device, as shown in Fig. 2, indicates that this water-jacket is elongated from front to rear, leaving an open chamber, as at 5, interior to this portion of the inner jacket. By this construction access may be had to the interior of the inner jacket, and any connections, such as blast-pipes or oil-feeding pipes, if the hydrocarbon fuel is to be used, may be easily adjusted from this side, as well as from the outside. Thus the ore within the furnace is acted upon from both inside and out, and by the use of the exterior and interior water-jackets and the peculiar shape thereof the body of ore passing down into the lower part of the furnace is made thinner and is more effectively subjected to heating action within the furnace.

It is my design to use oil as a principal fuel, and for this purpose the pipes 7 lead into the open interior 5 and their burners discharge through the upper part 3^b of the interior water-jacket. Other burners 8 open into the lower part of the furnace through the outer water-jacket 2.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a furnace having a shaft and crucible, and an exterior water-jacket, of an interior hollow water-jacket the outer walls of which are spaced from the inner walls of said exterior jacket said interior jacket having its upper portion converging and entering the lower part of the stack whereby said converging portion supports and arrests the ore passing from the furnace.

2. The combination in a smelting-furnace of a vertical stack, an exterior water-jacket and crucible in the lower portion, an interior hollow water-jacket having a surrounding space, said jacket having its upper end entering the lower part of the stack and having its greatest diameter intermediate of the ends whereby downwardly-converging passages are formed between the inner and outer wa-

ter-jackets and the inner jacket supports and arrests the ore passing through the bosh or neck of the furnace.

3. The combination in a furnace of a vertical stack adapted to receive the ore, a slag-chamber and crucible located in the lower part, a water-jacket surrounding said chamber, an interior hollow water-jacket located in the narrowed part of the furnace above the slag-chamber and horizontally coincident with the outer water-jacket, said inner jacket having an interior open chamber and the upper portion extending upwardly into the main part of the furnace.

4. The combination in a furnace of a vertical stack, a slag-chamber, and crucible, a water-jacket surrounding the lower part and having oil-burner pipes opening therethrough into the ore-chamber, an interior water-jacket having its upper portion converging toward the bosh or neck of the furnace to form inclined walls which support and arrest the ore passing therethrough and oil-burner pipes opening through the interior water-jacket into the ore-chamber.

5. The combination in a furnace of a vertical stack, slag-chamber, and crucible, water-jackets exterior and interior to the slag-chamber, said interior jacket having its walls converging in opposite directions from its middle portion and having an open central chamber, oil-burners extending from said chamber into the stack and other burners opening through the outer jacket into the slag-chamber.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN W. PACK.

Witnesses:
S. H. NOURSE,
JESSIE C. BRODIE.