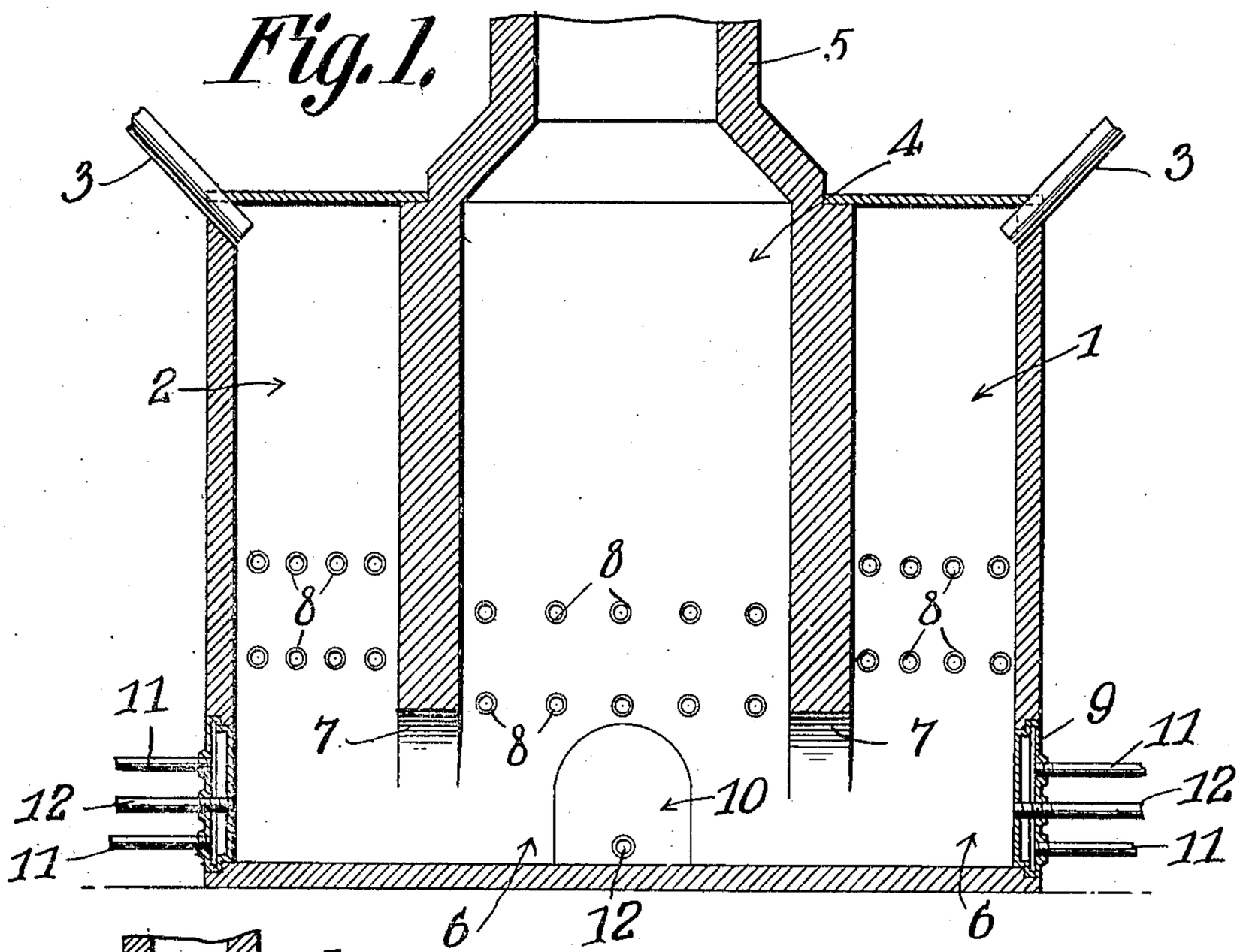
No. 849,686. PATENTED APR. 9, 1907.

N. JOHNSON.

FURNACE.

APPLICATION FILED JULY 16, 1906.

Fig. 1.



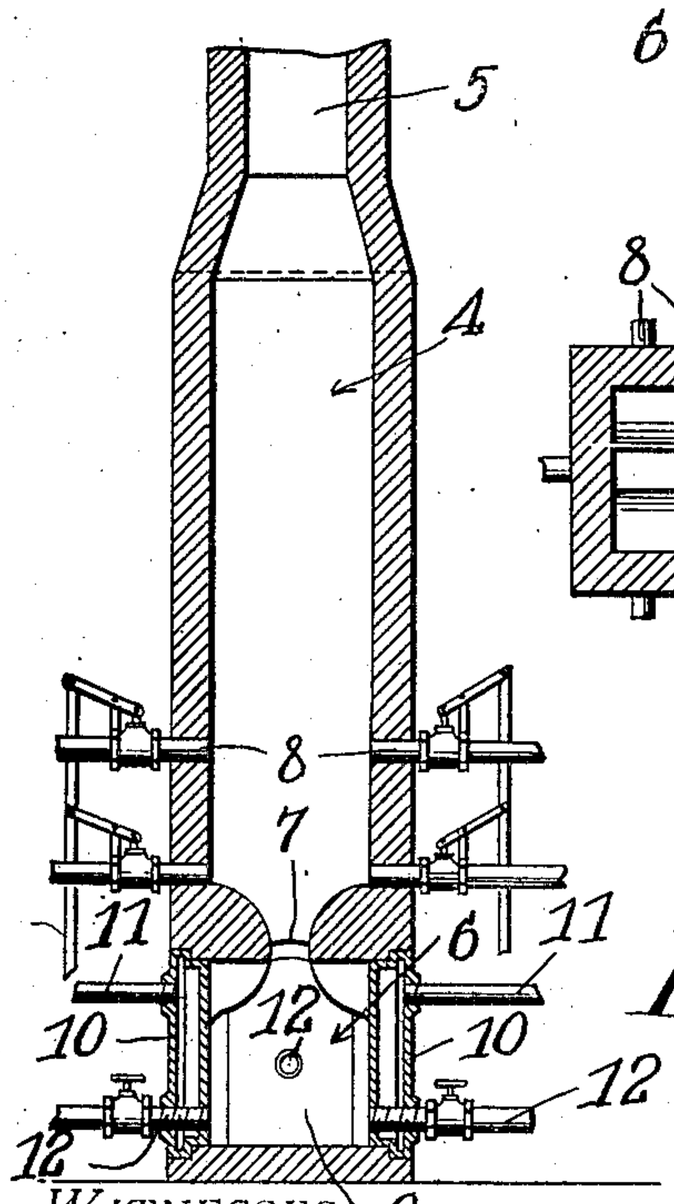


Fig. 2.

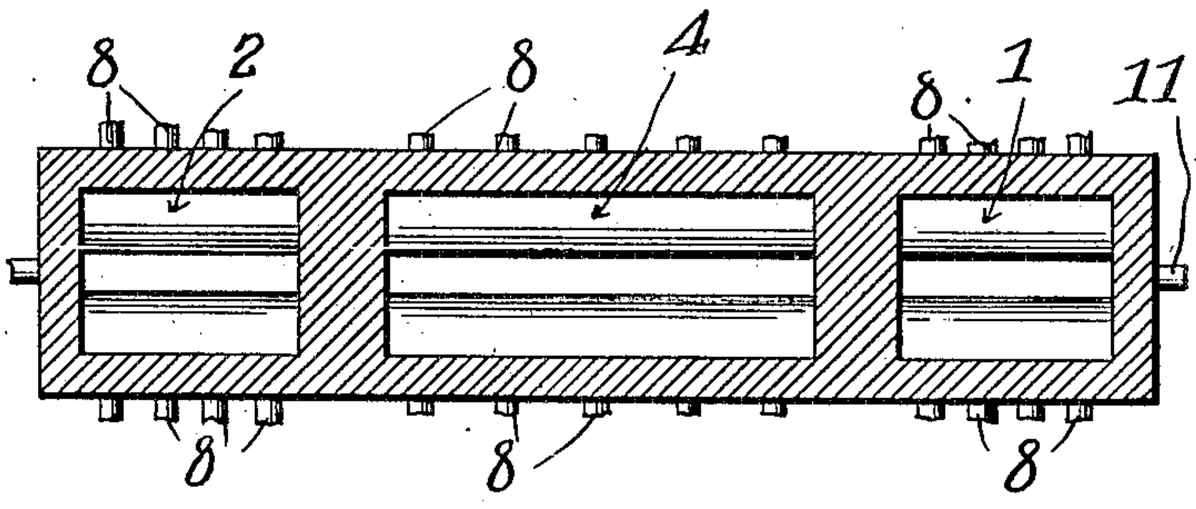


Fig. 3.

WITNESSES:

E. J. Stewart

Hubert B. Lawson.

Nels Johnson,

INVENTOR.

By Church & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

NELS JOHNSON, OF SPOKANE, WASHINGTON.

FURNACE.

No. 849,686. Specification of Letters Patent. Patented April 9, 1907.

Application filed July 16, 1906. Serial No. 326,482.

To all whom it may concern:

Be it known that I, NELS JOHNSON, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented a new and useful Furnace, of which the following is a specification.

This invention relates to blast-furnaces of that class employed in smelting or reducing metal ores, and it is more particularly an improvement upon the patent issued to M. Blanchard and C. D. Williams on September 22, 1903, No. 739,281. It has been found in the operation of said furnaces that it is impossible in a furnace of a large capacity to direct heat into all parts of the apparatus in order to smelt evenly. It is to overcome this defect that the present invention has been devised.

The invention consists of a pair of primary furnaces disposed at opposite sides of a secondary or intermediate furnace, all of these furnaces being provided with air-twyers, whereby the complete combustion of the smoke and hydrocarbon is effected and the ores quickly and thoroughly reduced. These furnaces are connected at the bottom by a single slag-pit running the full length thereof and provided with means whereby the slag and matte may be removed.

The invention also consists of certain other novel features of construction and combinations of parts, which will be hereinafter more fully described, and pointed out in the claims.

In the accompanying drawings is shown the preferred form of the invention.

In said drawings, Figure 1 is a vertical longitudinal section through the furnace. Fig. 2 is a central vertical transverse section, and Fig. 3 is a horizontal section.

Referring to the figures by characters of reference, 1 and 2 are similar primary furnaces closed at the top and having air-pipes 3 opening into the upper portions thereof at an incline, said air being adapted to be directed downward into the furnaces. These primary furnaces 1 and 2 are disposed at opposite sides of an intermediate or secondary furnace 4, which may be considerably larger than the furnaces 1 and 2, and has an outlet-stack 5. A slag-pit 6 extends under the three furnaces, and the products of combustion are adapted to pass from both primary furnaces to the secondary furnaces under arches 7, disposed between the lower portions of the furnaces. A plurality of twyers 8 is disposed within the lower portion of each furnace, so that air may be supplied in desired quantities to the contents of the furnaces, and thereby produce perfect combustion. A breast-jacket 9 is arranged within the outer end wall of each primary furnace, and other breast-jackets 10 are arranged in opposite walls of the secondary furnace at the bottom thereof. These jackets are hollow, and water circulates therethrough and through pipes 11, connected to them. Tap-pipes 12 may be extended through these breast-jackets, whereby molten material may be drawn from the slag-pit.

It is thought that the operation of this furnace will be fully understood by those acquainted with the art to which it relates. The ore, fluxes, and fuel are placed within the furnaces in alternate layers, and coal, wood, or other material suitable for starting the furnace is placed on the top of the contents of the primary furnaces and ignited. The blasts entering the pipes 3 will force a draft downward through the layers of fuel and ore, and the smoke and other products of combustion will commingle with fresh air admitted through the twyers 1 and 2, and a substantially perfect combustion of the carbonaceous particles will occur in these primary furnaces. The hot gases discharged from the lower portions of the primary furnaces escape under the arches 7 and commingle with the air supplied through the twyers into the intermediate or secondary furnace 4. The hydrocarbons remaining from the fuel in the furnaces 1 and 2, together with those combustible gases generated by the disintegration of the ores, are thus consumed. The ore contained within the furnaces is quickly reduced, because all parts thereof are evenly heated and practically perfect combustion is produced. By disposing the furnaces in the manner herein described the capacity of the same is greatly increased, because all parts of the ore will be evenly heated and combustion becomes practically perfect.

The preferred form of the invention has been set forth in the foregoing description; but I do not limit myself thereto, as I am aware that modifications may be made therein without departing from the spirit or sacrificing the advantages therein, and I therefore reserve the right to make such changes as fairly fall within the scope of the claims.

What is claimed is—

1. An apparatus of the character described comprising primary furnaces, a secondary furnace interposed therebetween, said furnaces communicating at the bottoms thereof, means for directing air-blasts downward into the tops of the primary furnaces, a stack extending from the top of the secondary furnace, and twyers opening into the primary and secondary furnaces.

2. An apparatus of the character described comprising a secondary furnace, primary furnaces disposed at opposite sides thereof, said furnaces communicating through a slag-pit disposed thereunder, means for directing an air-blast downward into the primary furnaces, a stack extending upward from the secondary furnace, twyers opening into each furnace above the slag-pit, and a breast-jacket within one wall of each furnace.

3. An apparatus of the character described comprising a secondary furnace, a stack extending upward therefrom, primary furnaces at opposite sides of the secondary furnaces, a slag-pit extending under said furnaces, said furnaces communicating through the slag-pit, means for directing air-blasts downward into the tops of the primary furnaces, twyers opening into all of the furnaces adjacent the slag-pit, and a hollow breast-jacket in a wall of each furnace, and means for establishing circulation of fluid thereto.

4. In an apparatus of the character described the combination with a secondary furnace; and a stack extending therefrom; of primary furnaces at opposite sides of the secondary furnace, a slag-pit extending beneath and constituting a means of communication between the bottoms of the furnaces, means for directing a blast downward into each primary furnace from the top thereof, twyers opening into the lower portions of the furnaces, a breast-jacket in one wall of each furnace, a tap-pipe extending from each furnace, and means for establishing a circulation of fluid through each breast-jacket.

5. In an apparatus of the character specified comprising primary furnaces and an intermediate or secondary furnace, said furnaces communicating through arches at the bottoms thereof, means for directing air-blasts downward into the tops of the primary furnaces, a stack extending from the top of the secondary furnace, and twyers, opening into the primary and secondary furnaces.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

NELS JOHNSON.

Witnesses:
JAMES B. GRAY,
MAURICE BLANCHARD.