No. 645,746. Patented Mar. 20, 1900.

F. HARDERT.

CUPOLA.

(Application filed Nov. 28, 1899.)

(No Model.)

Fig. 1.

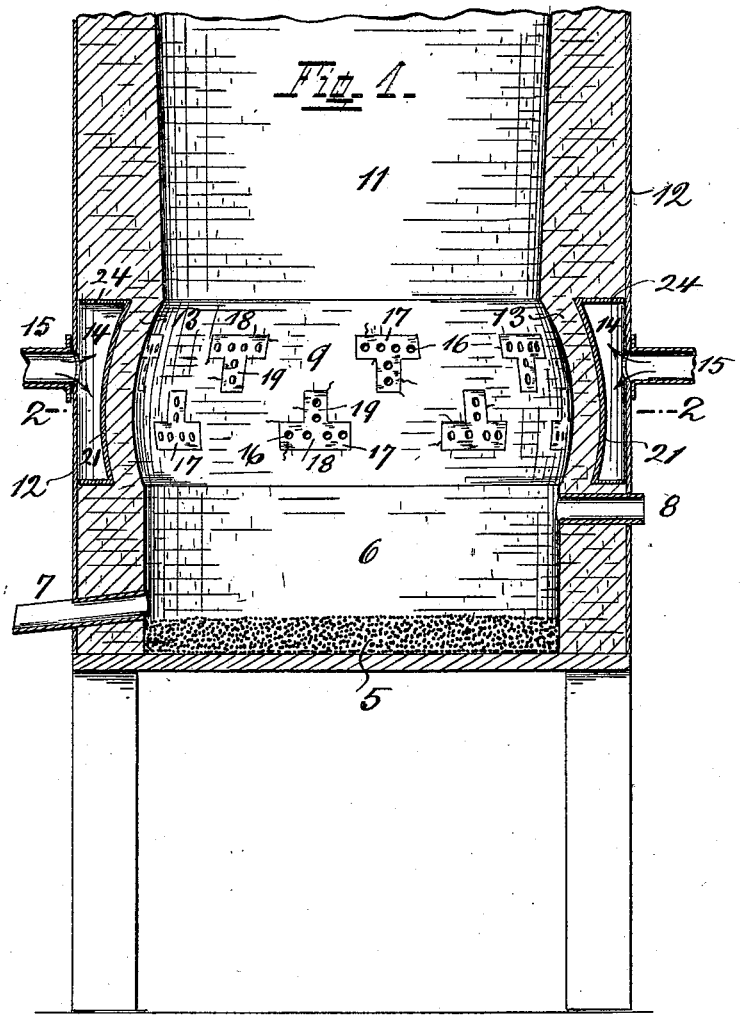


Fig. 3.

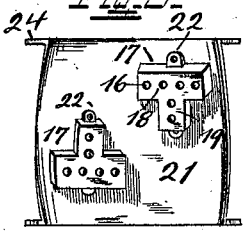


Fig. 4.

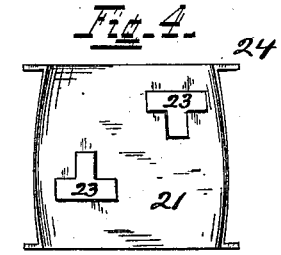


Fig. 5.

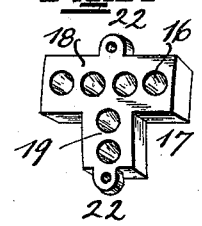


Fig. 2.

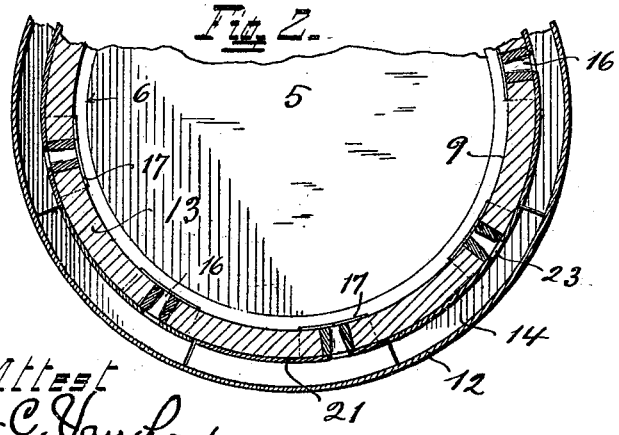
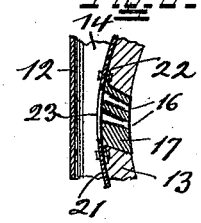


Fig. 6.



Attest
A. C. Vaughan.
James Hundley

Inventor
Frederick Hardert
by C. Spengel Atty

UNITED STATES PATENT OFFICE.

FREDERICK HARDERT, OF CINCINNATI, OHIO.

CUPOLA.

SPECIFICATION forming part of Letters Patent No. 645,746, dated March 20, 1900.

Application filed November 28, 1899. Serial No. 738,508. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HARDERT, a citizen of the United States, and a resident of Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Cupolas; and I do declare that the following is a description of the invention sufficiently clear, full, and exact to enable others skilled in the art to which it appertains to make and use the same, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form also a part of this specification.

This invention relates to improvements in cupolas or smelting-furnaces of the kind generally used in foundries. It relates more particularly to the construction and arrangement of the twyers, to the section of the furnace containing them, and to the manner of their attachment and support therein.

In the following specification, and particularly pointed out in the claims at the end thereof, is found a full description of my invention, together with its operation, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 shows a central vertical section of the lower part of a cupola or furnace provided with the improvements contemplated by my invention. Fig. 2 is part of a horizontal section taken on line 2 2 of Fig. 1. Fig. 3 shows inside view of a removed section of the inner shell forming the air-chamber and having twyer-blocks attached. Fig. 4 shows the same parts with the twyer-blocks removed. Fig. 5 is an enlarged perspective rear view of one of the twyer-blocks detached; and Fig. 6 is a vertical section through one of the twyer-blocks of the lower row, showing also adjacent portions of the air-chamber.

5 is the bed of the furnace, usually formed of sand and above which there is a short section 6, containing two outlet-openings 7 and 8, one providing for the discharge of the molten metal and the other being used for drawing off the dross and slag. Above section 6 there follows a section 9, which section between its lowest and highest points is curved outwardly, as shown. Above it there is another section 11, through which the charge enters and passes down and which from its lowest point tapers outwardly, as shown. The walls of the sections are generally of brickwork, the whole surrounded by an iron jacket 12. The curved wall 13 of section 9 is of less thickness than the wall of the other sections, the open space between it and jacket 12 forming an air-chamber 14, which through pipes 15 receives the air from a customary blower, (not shown,) which furnishes the blast. This section also contains the twyers 16, which discharge into the furnace the air received by chamber 14, the discharge being distributed over various points around the furnace, as hereinafter pointed out. These twyers are arranged in groups contained in cast-iron blocks 17, which are provided with openings, forming these twyers. These openings are wider at their receiving ends, and they are all inclined on an angle, thus directing the discharge also downwardly. These groups of twyers are disposed with spaces between them around the furnace in two horizontal rows, one below the other, and alternate vertically in such a manner that where there is a space in one row there is a group of twyers in the other one, above or below, as the case may be. Each group of twyers contains two rows, one row, 18, horizontally arranged and the other, 19, joining the same vertically. There are two twyer-openings in this latter row and four in the horizontal one, which numbers, however, may be changed. The twyers are further disposed so that in the upper row of groups the vertical row 19 of twyers is below the horizontal one, which arrangement is reversed in the lower row of groups. These twyer-blocks are attached to a shell 21, forming the inner wall of the air-chamber, which shell is also curved and against which the curved brick wall 13 is built. The attachment is by lugs 22 on the twyer-blocks and by bolts passing through them and the shell. At the point of connection this latter is cut out to provide an opening 23 sufficiently large to take in all the twyers of a block.

For convenience in construction the shell is divided in sections, as shown, the division being between blocks of twyers. The upper edge of these sections has a horizontal flange

24, which supports part of the wall of the upper furnace-section. The outwardly-curved wall 13 below the contracted part of the furnace above it permits the charge to readily clear itself in passing down and provides a free action and operation of the furnace. By reason of this shape wall 13 is also protected and less liable to wear and tear.

The air being first received within chamber 14 becomes heated, so that it discharges through the twyers in form of a hot blast. By reason of this latter and the shape of section 9 the action of melting is accelerated, and as a consequence a great saving in fuel (coke) is also attained.

Having described my invention, I claim as new—

1. In a cupola, the combination with upper and lower sections of its surrounding wall, of an intermediate section of such wall which is curved outwardly between its lower and upper ends, groups of twyers consisting each of a longitudinal and a vertical row of discharge-outlets, said groups all contained in the outwardly-curved wall and arranged therein with spaces between them in two annular rows, one above the other and further so arranged vertically that a group of twyers in one row alternates with a space in the other row, an air-chamber surrounding this curved section of the furnace-wall and means to supply air thereto.

2. In a cupola, the combination of an inclosing jacket, an outwardly-curved shell 21 provided with openings and arranged concentrically within the former with a space between it and said jacket, which space forms an air-chamber, means to supply air thereto, twyer-blocks containing each a number of downwardly-inclined and converging air-passages attached to shell 21 and projecting inwardly therefrom, being located thereon so that said passages coincide in position with the openings in the shell and a brick lining built against this latter and filling out the space between the twyer-blocks.

3. In a cupola the combination of an inclosing jacket, an outwardly-curved shell 21 provided with openings and arranged concentrically within the former with a space between it and said jacket which space forms an air-chamber, means to supply air thereto, twyer-blocks containing each a number of downwardly-inclined and converging air-passages attached to shell 21 and projecting inwardly therefrom, being located thereon so that said passages coincide in position with the openings in the shell and arranged therein with spaces between them in two annular rows, one above the other and further so arranged vertically that a block of twyers in one row alternate with a space in the other and a brick lining built against this shell and filling out the space between the twyer-blocks.

4. In a cupola, the combination with means for supplying an air-blast, of twyer-blocks supported in the wall thereof and containing each a number of air-passages arranged in a horizontal and vertical row, said blocks disposed in two rows around the furnace one row above the other one, and alternating so that in the upper row of blocks the vertical row of air-passages is below the horizontal one which disposition is reversed in the lower row.

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

FREDERICK HARDERT.

Witnesses:

W. E. BOYD,

C. SPENGEL.