

F. E. PARKS.
FURNACE PORT COOLING MEANS.
APPLICATION FILED MAR. 25, 1909.

932,493.

Patented Aug. 31, 1909.

2 SHEETS—SHEET 1.

Fig. 2.

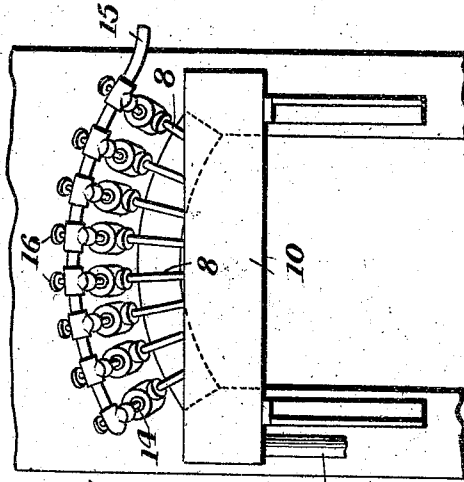
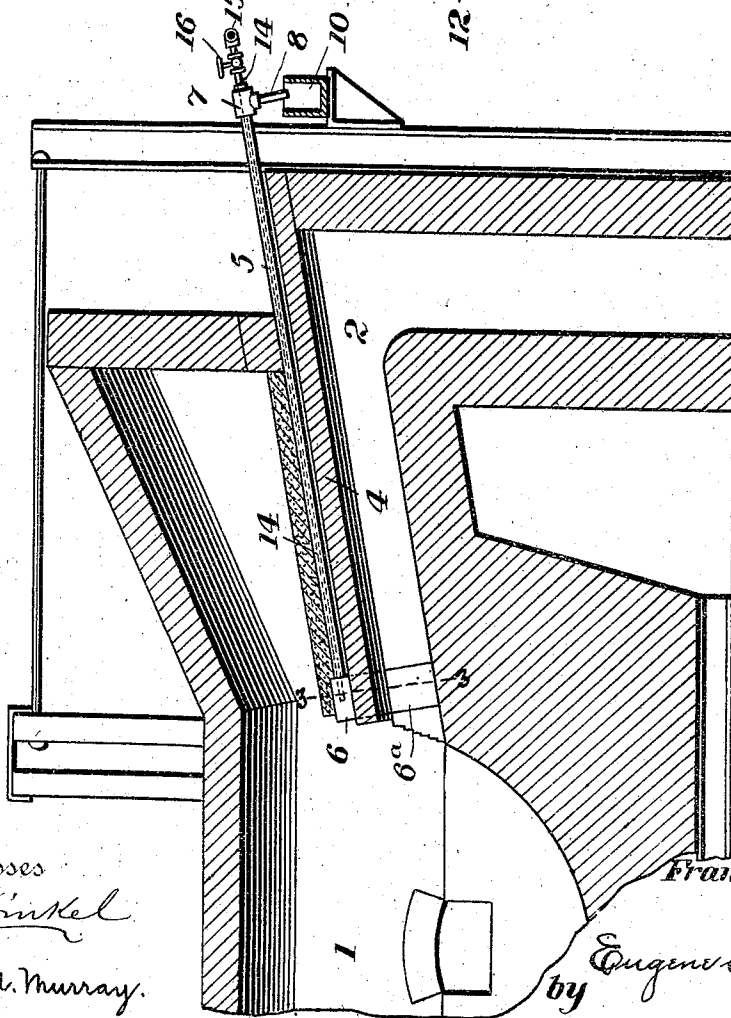


Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

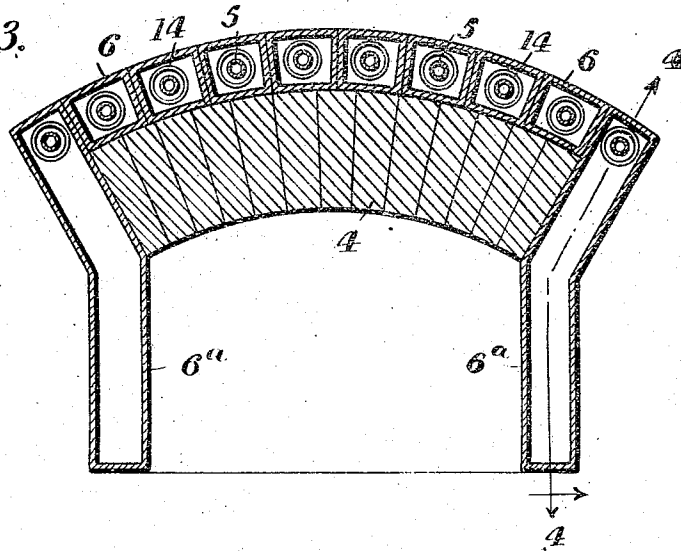


Fig. 4.

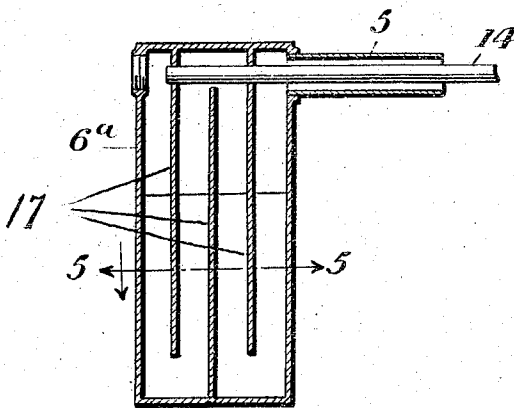
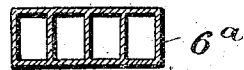


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

FRANK E. PARKS, OF PUEBLO, COLORADO.

FURNACE-PORT-COOLING MEANS.

932,493.

Specification of Letters Patent.

Patented Aug. 31, 1909.

Application filed March 25, 1909. Serial No. 485,841.

To all whom it may concern:

Be it known that I, FRANK E. PARKS, a citizen of the United States, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Furnace-Port-Cooling Means, of which the following is a specification.

My invention relates to means for cooling the arches and maintaining the gas ports of metallurgical furnaces, and is an improvement upon the construction shown in a prior patent No. 896,937, granted jointly to H. A. Deuel and myself. In addition to the arch cooling means disclosed in said former patent, my present invention provides a water-cooled frame for the inner end of the gas-port and effectually prevents any cutting back at the inner end of the port, where it is particularly important that the shape and dimensions of the port opening should be maintained.

The invention will be understood from the following description in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal section of one end of an ordinary open hearth furnace, showing the manner of applying my invention; Fig. 2 is an end view of the arch structure showing the water-supply and discharge connections in elevation; Fig. 3 is a cross-section on the line 3—3, showing the water-cooled frame at the inner port opening; Fig. 4 is a vertical longitudinal section on the line 4—4 of Fig. 3; and Fig. 5 is a horizontal cross-section on the line 5—5 of Fig. 4.

The furnace 1 is provided with the usual gas ports 2, leading from the slag pockets or regenerators into the furnace. The arch 4 of the ports is constructed of silica brick or other suitable refractory material and is cooled in the manner described in said prior patent, by means of a plurality of pipes 5, extending longitudinally directly above the arch and embedded in a covering of silica sand, magnesite, or other refractory material, which is tamped up to the required thickness over the arch bricks, whereby the pipes are protected from the flame of the furnace and at the same time by their juxtaposition with the port walls serve to cool and maintain intact the refractory material of the port structure.

In my present invention, each pipe terminates in a hollow, rectangular metal block 6, which may be a bronze casting, the pipe be-

ing preferably screw-threaded therein, as shown in Fig. 4. The outer blocks on either side are angular and extended so as to constitute skew-backs for the arch bricks and sides for the port opening, the intermediate blocks forming a complete arch above the port arch and with the side blocks constituting a metal water-cooled frame for the port opening, as shown in Fig. 3. This feature of my invention is important since it provides a means for maintaining the size of the port openings always the same, and insures uniformity of working by reason of the fact that the point of combustion remains fixed. It will be apparent that the continuous water-cooled frame at the mouth or inner end of the port where the heat is most intense, effectually prevents any distortion due to the cutting back action which usually occurs at this place.

The outer end of each pipe 6 is provided with a T-fitting 7, having a short discharge pipe 8, which empties into a trough 10, having a sewer connection 12. Within each pipe 5 is a smaller pipe 14, having its open inner end leading into the terminal block 6, and its outer end connected to a supply pipe 15, the flow through each pipe being controlled by a valve or cock 16.

In order to insure a complete circulation of water through all parts of the long side blocks 6^a, partitions 17, alternating from either end provide a tortuous channel lengthwise of the block, the water being led into the inner compartment as shown in Fig. 4. It will be noted that the incoming cold water is thus discharged at the inner ends of the pipes 14, into the hollow terminal metal blocks over the arch and at the sides of the port opening where the heat is most intense, and that in its return or discharge it passes through the pipes 5, lying directly over and in contact with the brick arch of the gas port, thereby protecting the same from the deterioration which results from the high temperature of the outgoing gases during the frequent reversal of the furnace.

Having thus described my invention, I claim:—

1. In a regenerative-furnace, a port extending within the furnace, and means for maintaining the port-structure comprising a water-cooled frame having side jambs constituting a portion of the inner end of the port, and fluid circulating conduits connected therewith.

2. In a regenerative-furnace, a port extending within the furnace, and means for maintaining the port-structure, comprising a water-cooled frame having a plurality of independent chambers in the port-structure adjacent the inner end thereof, and a fluid-circulating conduit connected with each chamber.
3. In a regenerative-furnace, a port extending within the furnace, and means for maintaining the port-structure, comprising a water-cooled frame having a plurality of independent chambers in the port-structure adjacent the inner end thereof, and a fluid-circulating conduit connected with each chamber, said conduits arranged longitudinally of the structure and embedded in refractory material.
4. In a regenerative-furnace having a port provided with refractory walls extending within the furnace, a water-cooled metal frame constituting side jambs for the port at the inner end thereof.
5. In a regenerative-furnace having a port provided with refractory walls extending within the furnace, a water-cooled metal frame constituting side jambs for the port and skew-backs for the port-arch at the inner end thereof.
6. In a port-structure of a regenerative-furnace, a water-cooled metal frame constituting a portion of the sides and top of the port wall at the inner end of the port.
7. In a port-structure of a regenerative-furnace, a water-cooled metal frame constituting a portion of the inner end of the port, and a skew-back upon either side of the port-arch.
8. In a regenerative-furnace having a port provided with refractory walls extending within the furnace, a self-supporting arch of refractory material, and a water-cooled metal arch in contact with the upper side of the port-arch at the inner end thereof.
9. A water-cooled port for regenerative furnaces, comprising a self-supporting arch of refractory material, hollow metal blocks overlying the arch at the inner end thereof and forming an arch thereover, a plurality of cooling pipes arranged in close contact with the upper side of the arch and each terminating within one of said hollow blocks, and an independent fluid-supply pipe passing through each cooling pipe and arranged to discharge fluid within the hollow block at the inner end thereof.
10. A water-cooled port for regenerative furnaces, comprising a self-supporting arch of refractory material, hollow metal blocks overlying the arch at the inner end thereof and forming an arch thereover, the end blocks being extended to form skew-backs for the port-arch and side jambs for the port, a plurality of cooling pipes arranged in close contact with the upper side of the arch and each terminating within one of said hollow blocks, and an independent fluid-supply pipe passing through each cooling pipe and arranged to discharge fluid within the hollow block at the inner end thereof.
- In testimony whereof I affix my signature, in presence of two witnesses.
- FRANK E. PARKS.
- Witnesses:
JAS. H. ROBINSON,
FRED DARROCH.