No. 886,286. PATENTED APR. 28, 1908.

D. H. BROWNE.

SMELTING FURNACE SPOUT.

APPLICATION FILED JULY 18, 1905.

Fig. 1.

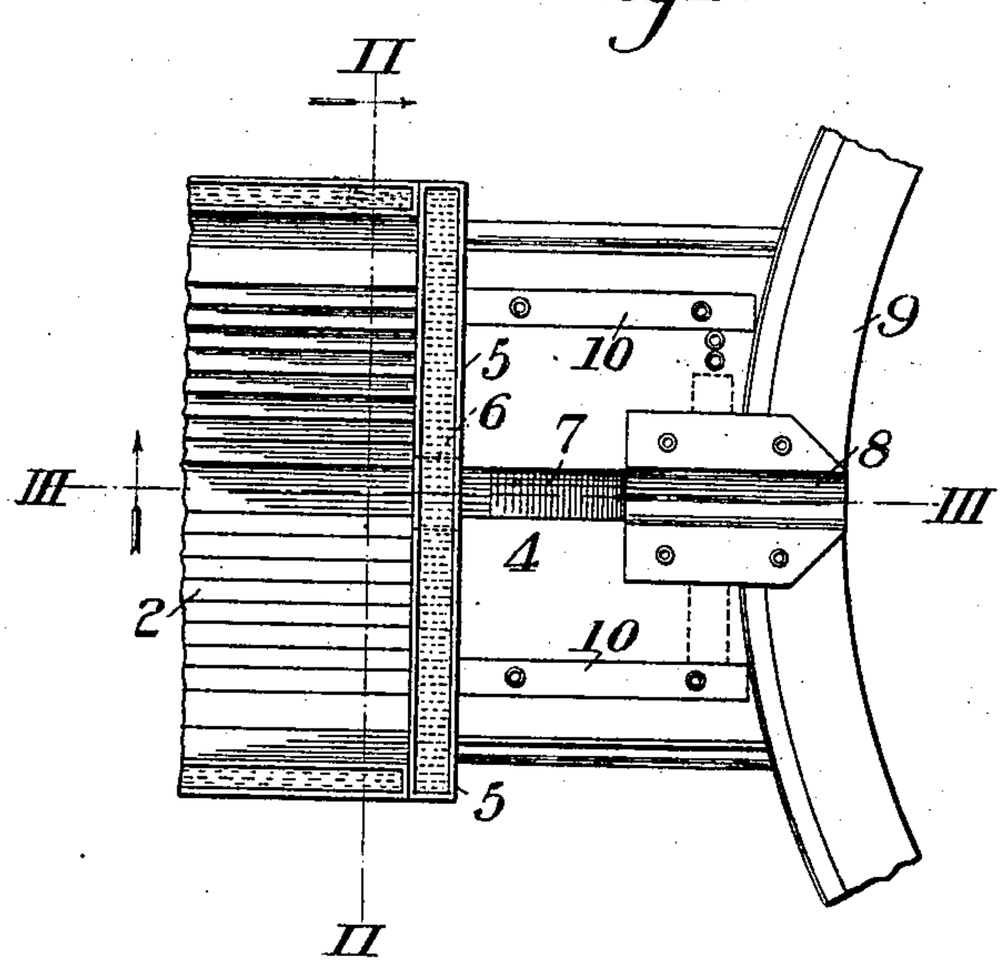


Fig. 2.

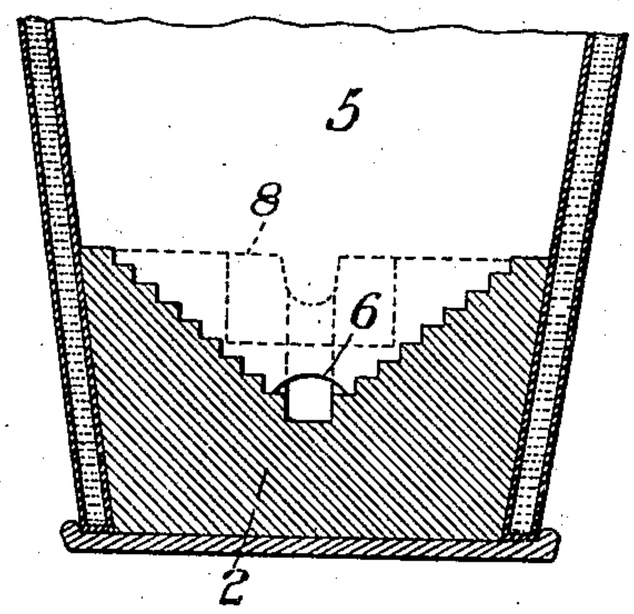


Fig. 3.

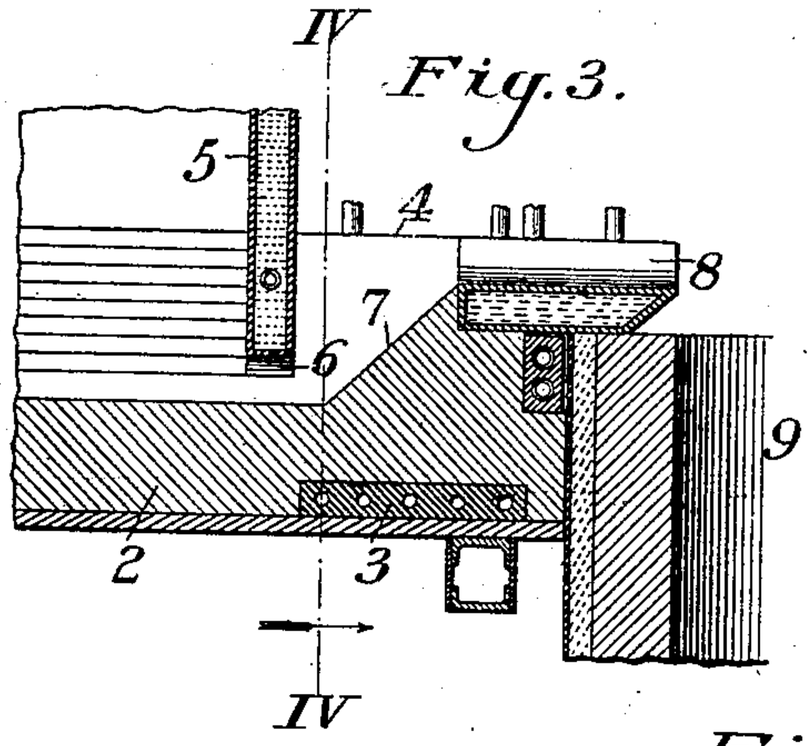


Fig. 4.

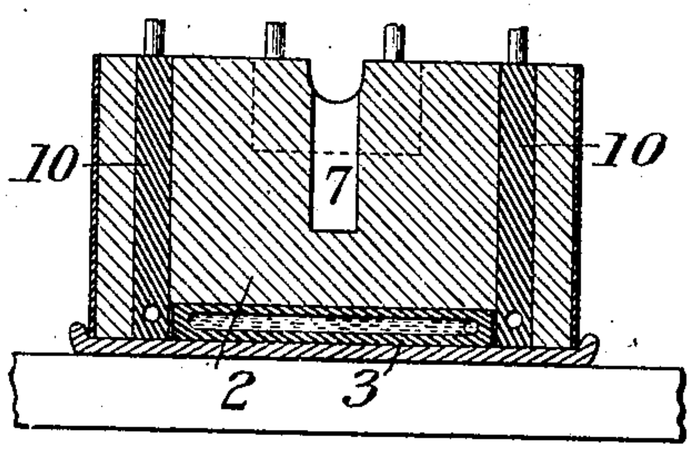
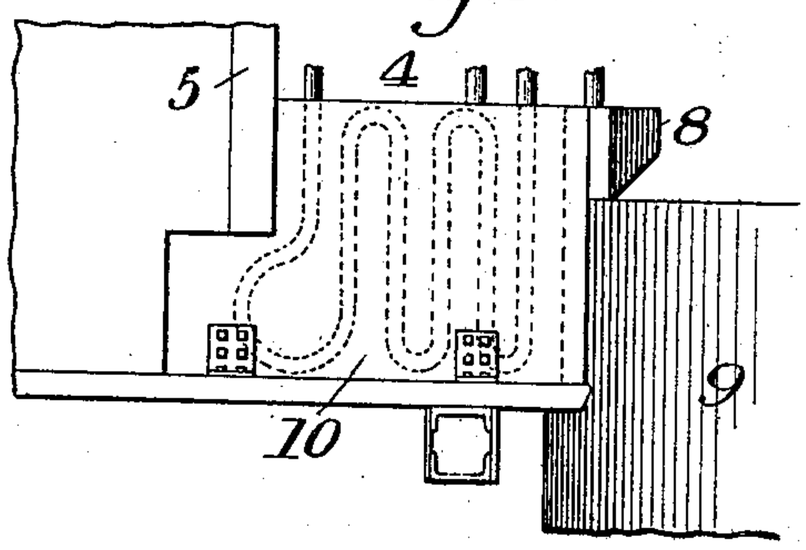


Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

DAVID H. BROWNE, OF COPPER CLIFF, ONTARIO, CANADA, ASSIGNOR TO THE CANADIAN COPPER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF OHIO.

SMELTING-FURNACE SPOUT.

No. 886,286. Specification of Letters Patent. Patented April 28, 1908.

Application filed July 18, 1905. Serial No. 270,183.

To all whom it may concern:

Be it known that I, DAVID H. BROWNE, a citizen of the United States, residing at Copper Cliff, in the Province of Ontario, Dominion of Canada, have invented a new and useful Smelting-Furnace Spout, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view showing the end portion of a cupola furnace with my improved spout discharge and the settling well; Fig. 2 is a vertical section on the line II—II of Fig. 1, viewed in the direction of the settling well; Fig. 3 is a vertical section on the line III—III of Fig. 1; Fig. 4 is a vertical section on the line IV—IV of Fig. 3; Fig. 5 is a side elevation showing the water-cooled retaining plate.

In modern water-jacketed furnaces for the smelting of copper, nickel and other ores, and the production of mattes, it has heretofore been customary to provide at the end or side of the furnace an opening known as the "connection-hole" extending through a water-jacketed plate or between two water-jacketed plates for the escape of matte and slag from the furnace, and also to provide a water-jacketed wrought iron or copper spout, fixed in front of the connection hole, so that the matte and slag passing from the furnace through the connection-hole is compelled to rise in the spout to a greater height than the highest point of the said connection hole, thereby forming a trap which prevents the blast from blowing out of the spout.

It has been found by experience that in working on low grade copper mattes and on nickel-iron mattes such customary arrangement is unreliable and dangerous, since the stream of matte acting on the lower side of the connection hole soon corrodes and cuts through the iron water-jacket of the furnace or the spout and causes explosions. In order to avoid such explosions and produce a safe and expeditious delivery of matte and slag from the furnace, I prepare a spout in the following manner: As shown in the drawing the bottom and hearth walls 2 of the cupola furnace are lined with refractory brick, preferably chrome brick, and this lining is extended beyond the end or side of the furnace over a water-cooled iron bed plate 3 at the bottom of the spout 4, thus forming a continuous brick bottom extending within the furnace and spout. 5 is the water-cooled plate or jacket which constitutes the front wall of the furnace, and which has an opening 6 at its base leading into the spout and constituting the connection hole; but unlike constructions heretofore used this hole has a brick floor instead of a water-cooled plate. The spout 4 is constituted by a box of refractory brick, preferably chrome brick, the bottom of which extends upwardly at an angle over the plate 3 and terminates at an elevated water-cooled trough 8 which discharges into the settling well 9. The outer surface of the walls of the spout are confined by water-cooled plates 10. By reason of this construction the matte and slag passing from the furnace through the spout travel under a water-jacketed plate and over a refractory brick bottom. The refractory brick would be readily corroded by the slag, although it is unaffected by the matte, but it is protected from destruction by the cooling action of the plates 3 and 10. The bottom of the spout is thus effectually protected. The upper portion of the brick walls is corroded by contact with the slag to a considerable extent, but the integrity of the walls is maintained by the cooling action of the side plates.

The advantages of my invention are that it prevents the evils above mentioned and affords a durable and easily operated cupola spout which is not subject to dangerous accidents.

Within the scope of my invention as defined in the claims the construction may be modified, since

What I claim is:—

1. A smelting furnace having a water jacket wall, the bottom and hearth walls being lined with refractory material, there being a connection opening having its top defined by the bottom of the water jacket wall and its bottom defined by the refractory bottom of the furnace, a spout of refractory material in communication with the connection opening and rising above the same, the internal bottom portion of the spout being inclined upwardly and outwardly from the connection opening, water-cooled elements within the bottom portion, sides and outer end of the spout, and a water-cooled trough set into the top of the spout and leading outwardly therefrom.

2. A smelting furnace having a water jacket wall, the bottom and hearth walls be-

ing lined with refractory material, there being a connection opening having its top defined by the bottom of the water jacket wall and its bottom defined by the refractory bottom of the furnace, a spout of refractory material communicating with the connection opening and rising above the same, water-cooled elements embedded in the bottom, sides and outer ends of the spout, and a water-cooled trough embedded in the top of the spout and leading outwardly therefrom.

3. A smelting furnace having a water jacket wall, the bottom and hearth walls being lined with refractory material, there being a connection opening having its top defined by the bottom of the water jacket wall and its bottom defined by the refractory bottom of the furnace, said refractory bottom being extended externally of the furnace and formed into an integral spout in communication with the connection opening and rising above the same, the internal bottom portion of the spout being inclined upwardly and outwardly from the connection opening, water-cooled elements embedded in the sides, bottom, and outer end of spout, and a water-cooled trough embedded in the top of the spout and leading outwardly from the inclined wall thereof.

4. A smelting furnace having an outlet spout and provided with a connection hole communicating with the spout below the outlet end thereof, whereby the hole is trapped against the action of the twyers, the top wall of the hole being formed by a water jacket, the bottom of the hole being formed of refractory material, and a water-cooled trough constituting the upper outlet end of the spout, substantially as described.

5. A smelting furnace having its bottom and hearth walls formed of refractory material which is projected at one side of the furnace to form a spout, a water jacket extending between the hearth walls and defining one side of the furnace, a portion of the bottom of the jacket terminating short of the bottom of the furnace and constituting the top wall of the connection hole, the bottom of said hole being formed by the bottom of the furnace, the connecting hole being located below the outlet end of the spout, whereby the hole is trapped against the action of the twyers, and a water-cooled trough set in the top of the spout and constituting the outlet thereof, substantially as described.

6. A smelting furnace having its bottom and hearth walls of refractory material and at least one upright water jacket having a bottom portion terminating short of the bottom of the furnace and defining the top of a connection hole, the bottom of the hole being defined by the refractory bottom of the furnace, the bottom and hearth walls being projected in front of the connection hole and having a spout therein in communication with the connection hole, the top of the spout being above the top of the connection hole to form a trap, and a water cooled trough set in the top of the projected portions of the bottom hearth walls and constituting a trough in communication with and leading away from the upper outer portion of the spout, substantially as described.

In testimony whereof, I have hereunto set my hand.

DAVID H. BROWNE.

Witnesses:
R. F. KIRKWOOD,
A. LUUCH.