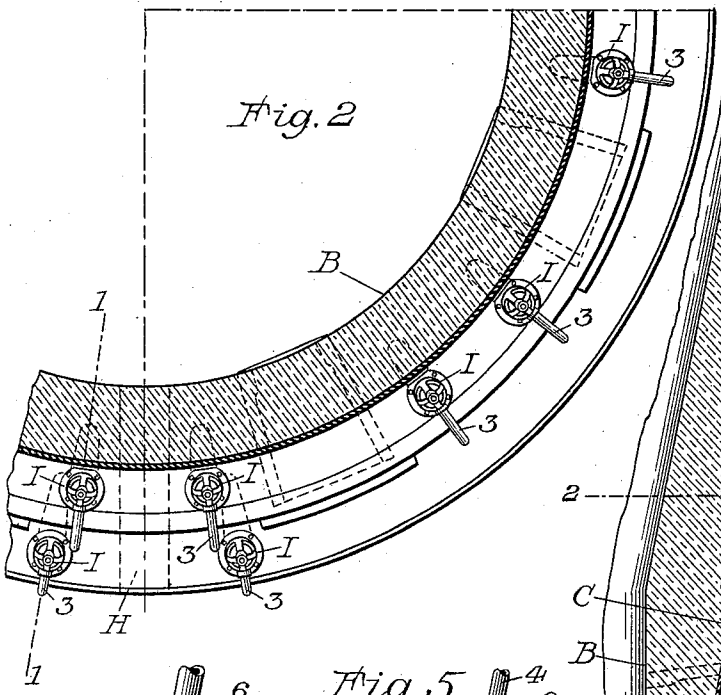
No. 614,381. Patented Nov. 15, 1898.

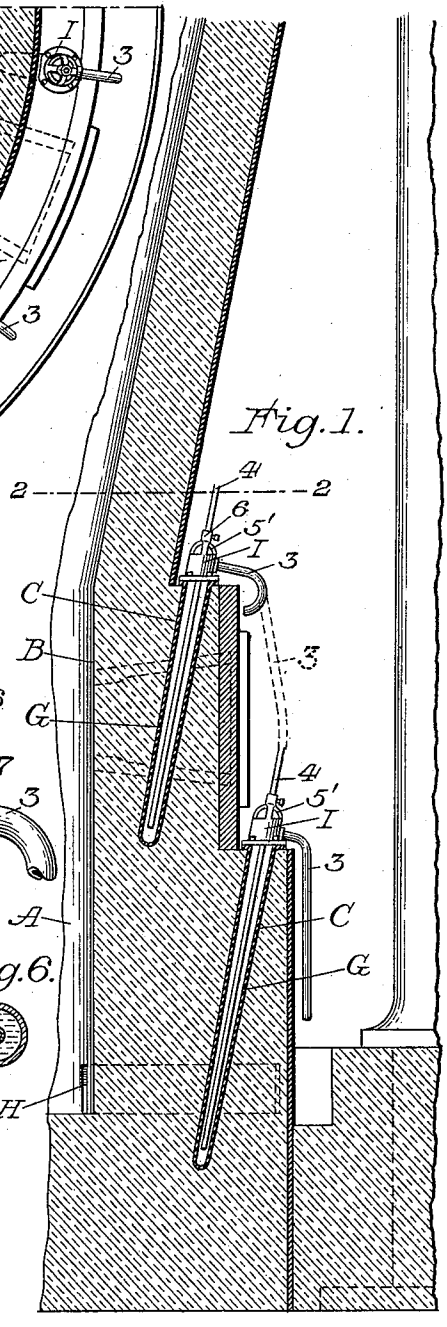
A. P. GAINES.

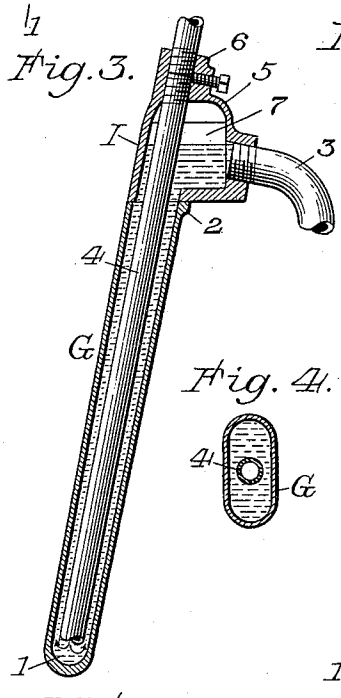
COOLING DEVICE FOR FURNACE WALLS.

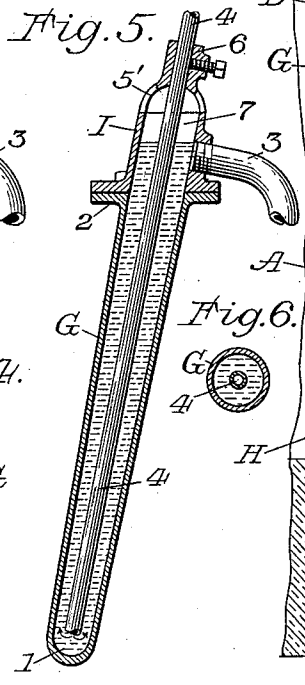
(Application filed June 11, 1898.)

(No Model.)









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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

AMBROSE PORTER GAINES, OF SOUTH PITTSBURG, TENNESSEE.

COOLING DEVICE FOR FURNACE-WALLS.

SPECIFICATION forming part of Letters Patent No. 614,381, dated November 15, 1898.

Application filed June 11, 1898. Serial No. 683,167. (No model.)

To all whom it may concern:

Be it known that I, AMBROSE PORTER GAINES, a citizen of the United States, residing at South Pittsburg, county of Marion, State of Tennessee, have invented certain new and useful Improvements in Cooling Devices for Furnace-Walls, of which the following is a specification.

My invention relates to improvements in apparatus for protecting the twyer-wall, hearth-wall, and tapping-holes or metal-notches in blast or smelting furnaces; and one object of my invention is to provide a device for this purpose, which I term a "jamb-pipe," that will effectually protect such tapping-holes or metal-notches and prevent the enlargement thereof due to cutting out of the furnace-wall at the sides or jambs when left unprotected or insufficiently protected, as heretofore.

Further objects are to so construct the device that it will obviate the frequent explosions that occur around the metal-notch employing the cooling means heretofore in common use in smelting-furnaces, to provide a cooling and protecting device or apparatus for metal-notches which will be susceptible of ready examination while in operative position in the furnace-wall and one in which any obstruction to the free circulation of the cooling liquid therein can be easily and quickly removed without necessitating the removal of the device from the furnace-wall, and, finally, to provide a device of the character indicated which will be adapted for ready application to all furnaces of modern construction.

With these general objects in view my invention consists in the novel construction of jamb-pipe and its accessories, as hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section of the furnace-wall on line 1 1, Fig. 2, showing my invention applied thereto. Fig. 2 is a horizontal quarter plan section on line 2 2, Fig. 1. Fig. 3 is a vertical section of the jamb-pipe. Fig. 4 is a transverse section thereof. Fig. 5 is a vertical section of a modification. Fig. 6 is a transverse view thereof corresponding to Fig. 4.

Referring to the drawings, in which the same reference characters designate the same or corresponding parts in all the views, the letter A designates the hearth-wall, B the twyer-wall, and H the tap-hole. In the wall are inclined recesses C, into which the jamb-pipes are inserted, the said recesses being inclined from the outside toward the inside of the wall and in a downward direction. The jamb-pipe consists, essentially, of the metal tube G, preferably in cast-copper or bronze, which is closed at its lower end 1 and is provided with a flange or seat 2 at its upper open end for the attachment of the jamb-pipe cap I. This tube may be either of circular cross-section, as shown in Fig. 4, or elongated cross-section, as shown in Fig. 6, and is slightly tapered, so that its body is conical or wedge shape, according as its cross-section is round or elongated, to facilitate its removal from the wall if necessary.

The cap I forms a water-tight contact with the upper open end of the jamb-pipe and constitutes a basin or reservoir 7 for the water as it rises in the jamb-pipe and may be offset at the top of the pipe, as in Fig. 3, or not, as in Fig. 5. An overflow or discharge pipe 3 is connected to the outer side of this basin, and the said basin may be closed by a cap having a solid web 5 or with an open web 5′, as shown in Figs. 3 and 5, respectively. In either case the top of the basin supports the hub 6, through which the inlet-pipe 4 is inserted into the jamb-pipe and extends to within a short distance of the bottom of said jamb-pipe, thus forming an annular chamber between the inner wall of said tube and the outer wall of said inlet-pipe, through which chamber the water circulates in an upward direction, and is secured by suitable means, such as a set-screw, as shown.

When the closed cap is used, the jamb-pipes may be applied in series with respect to the circulation of the cooling liquid by connecting the discharge-pipe 3 of any one jamb-pipe to the inlet-pipe 4 of the other adjacent jamb-pipe, and any additional number of jamb-pipes may be thus connected to secure the desired result, as shown in dotted lines, Fig. 1.

In operation the cooling liquid enters the upper end of the jamb-pipe through the inlet-pipe 4, flows into the jamb-pipe at its lower end 1, and returns upward through the jamb-

pipe G, filling the cap-basin up to the overflow or discharge pipe 3, which delivers the water into the waste-trough, allows it to drop onto the exterior of the furnace-jacket to keep it cool, or delivers it through the inlet-pipe 4 of the jamb-pipe next in series when the closed top is used.

It should be understood that the jamb-pipe G may be used at any desired intervals or spaces all around the hearth-wall A, as shown in the twyer-wall, Fig. 2, thus cooling and protecting the hearth-wall as well as the jambs for the tap-hole or metal-notch H.

The advantages of my device are, first, that it is safe from explosions, which so often occur around the metal-notch where closed water-cooling devices are used if the open-top cap be used; second, it can be readily examined inside and obstruction to free circulation of water removed by taking off the cap without the necessity for removal of the jamb-pipe from the furnace, which, however, is easily accomplished when necessary or desirable for any other purpose. Furthermore, this device is particularly easy of application to modern furnace construction, which favors practically solid metal shells around the hearth and twyer walls for the reason that no holes or apertures are required to be cut either in the twyer-jacket or in the hearth-jacket; and, lastly, the water circulation is in a vertical direction, and is therefore thorough, positive, and under full control, thus making an efficient device for cooling.

I claim as my invention—

1. The combination with the wall of a blast or other furnace, provided with one or more recesses therein, of one or more jamb-pipes, each consisting of a tube closed at the lower end and having straight outer walls whereby the said pipe may be readily inserted in and withdrawn from said recess, an inlet-pipe extending downwardly into the tube and terminating in close proximity to the closed end thereof, thereby forming an annular circulating-chamber between the inlet-pipe and the inner wall of the tube, and an outlet-pipe connected to said tube near the top and communicating with the said annular chamber.

2. The combination with the hearth-wall of a blast or smelting furnace, of a jamb-pipe inserted in said hearth-wall and consisting of a tube closed at the bottom, an inlet-pipe extending through the top into the tube and terminating near the bottom, and an outlet-pipe connected to the tube near the top and arranged to discharge the liquid against the sides of the wall, substantially as described.

3. The combination with the tapping-hole and hearth-wall of a blast-furnace, of one or more jamb-pipes inserted in the said wall and extending downwardly in an inclined direction adjacent to the tapping-hole, said jamb-pipe consisting of a tube closed at the bottom and an inlet-pipe extending downwardly within the tube and discharging near the bottom thereof, a cap at the top forming a basin or reservoir into which the water flows upwardly, and an outlet-pipe connected to the basin, substantially as described.

4. The combination with a furnace-wall having a series of inclined recesses therein, of jamb-pipes inserted in said recesses, each of said pipes consisting of a tube closed at the bottom and having straight outer walls whereby the said pipe may be readily inserted in and withdrawn from said recess, an inlet-pipe extending downwardly into the tube and terminating near the bottom thereof, thereby forming an annular circulating-chamber between the inlet-pipe and inner wall of the tube, and an outlet-pipe connected to the tube near the top thereof and communicating with the annular chamber, substantially as described.

5. The herein-described jamb-pipe for furnace-walls, consisting of a tube closed at one end, an inlet-pipe extending within the tube and terminating near the closed end, a cap on the other end of said tube through which the inlet-pipe extends and forming an overflow basin or reservoir, and an outlet-pipe connected to said cap, substantially as described.

6. The herein-described jamb-pipe for furnace-walls consisting of a tube closed at one end, a cap forming an overflow-basin at the other end thereof, an inlet-pipe extending through said cap into the tube and terminating near the closed end thereof, and an outlet-pipe connected to the cap and bent so as to discharge the cooling liquid therefrom toward the furnace-wall when in position therein, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AMBROSE PORTER GAINES.

Witnesses:
JAS. L. GAINES,
W. E. CARTER.