F. C. ROBERTS.

FURNACE COOLING.

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1,030,792.

Patented June 25, 1912.

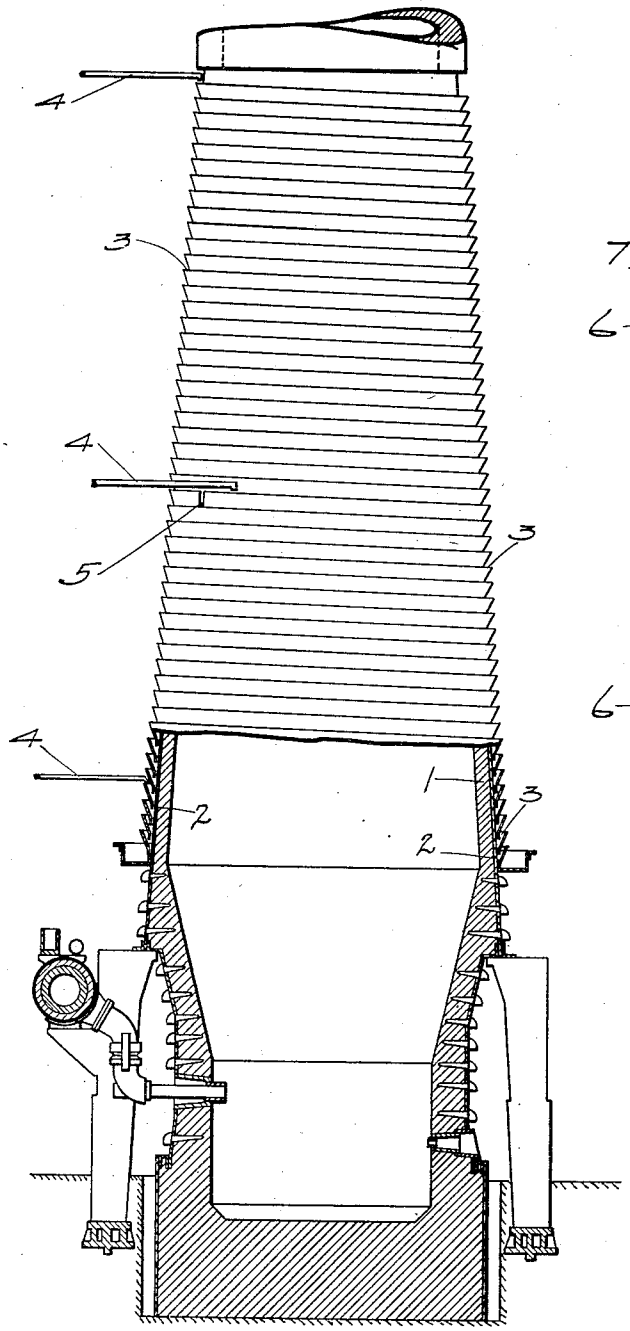

FIG. 1.

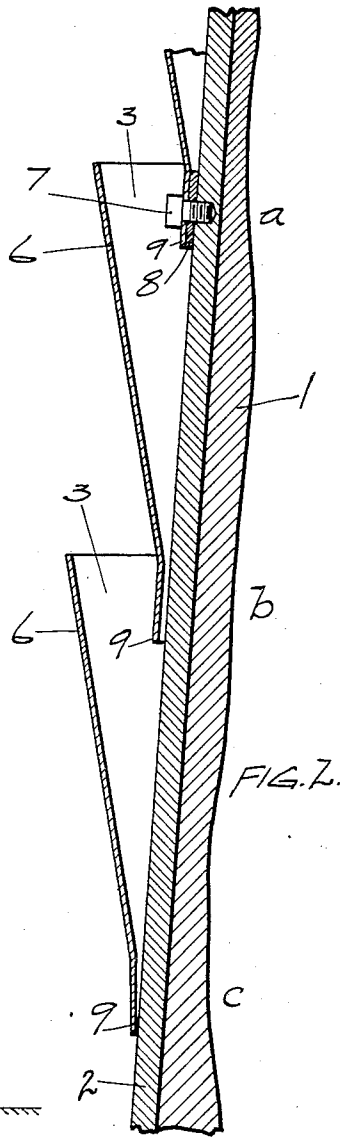

FIG. 2.

WITNESSES:

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FURNACE-COOLING.

1,030,792. Specification of Letters Patent. Patented June 25, 1912.

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To all whom it may concern:

Be it known that I, FRANK C. ROBERTS, a citizen of the United States, residing at Wynnewood, in the county of Montgomery and the State of Pennsylvania, have invented certain new and useful Improvements in Furnace-Cooling, of which the following is a specification.

The modern practice in constructing blast furnaces is to provide a thin wall of brick surrounded and supported by a metallic sheath or casing instead of the thick brick wall formerly used. In this construction it is desirable to provide means for cooling the walls and dissipating the heat. Water is commonly used for this purpose being applied to the top of the wall and allowed to run down or applied at a plurality of points along the height of the wall.

It is the object of my invention to provide improved means for applying the water or other cooling medium to the furnace wall. My invention is particularly directed toward cooling the in-wall of the furnace; *i. e.*, that portion of the furnace lining between the bosh and the top of the furnace but the same or similar means might be used for cooling the bosh or other portions of the furnace wall.

I provide a trough or plurality of troughs surrounding the sheath through which the cooling medium may pass and leave an opening at the bottom of the troughs through which the cooling medium may pass and cover the surface of the furnace. It may be desirable to arrange the trough in a spiral to lead the cooling medium from the top to the bottom of the furnace or the trough need not be continuous from top to bottom but may be made up of a plurality of sections, each being provided with a separate means of supplying the cooling medium or a spiral trough extending throughout the length of the furnace may, instead of being supplied only at the top, have auxiliary or additional supplying means at a plurality of points on the furnace height. In addition to passing the cooling medium in the path about the furnace as directed by the trough, I may leave a more or less continuous passage way along the bottom of the trough through which a portion of the cooling medium may pass from one course to another vertically. I thus provide a dual course for the cooling medium and apply it to practically the entire surface of the furnace. The opening along the bottom of the trough is preferably adjustable in width so that more or less of the cooling medium may be caused to take the vertical path. The size and incline of the trough and the quantity of water therein may vary and the distance between the successive courses may vary so that practically the entire surface of the furnace may be covered by the trough or there may be more or less of the furnace surface to be covered by the vertical passage of the cooling medium between the courses of the trough.

In the accompanying drawings which show one form my invention may take, Figure 1 is a side elevation of a blast furnace partly in section showing the in-wall arranged to be cooled; Fig. 2 is an enlarged sectional detail view showing three courses of the trough.

The in-wall of the furnace extends from the bosh to the top of the furnace and, as shown, consists of a thin lining, 1, of fire brick surrounded and supported by a metallic sheath or casing, 2, over which passes the cooling medium. I have shown a spiral trough, 3, extending throughout the height of the in-wall and supplied with a cooling medium through pipes, 4, of which there may be one at the top and there may be one or more at other points along the furnace height. As indicated at 5, the trough may be broken up into two or more separate sections or may be divided by partitions and each section or part may be supplied with the cooling medium through one or more pipes, 4. The cooling medium then takes a spiral path about the furnace wall and comes into contact with more or less of its surface, depending upon how close together are the courses of the spiral trough and how deep the cooling medium is in the trough.

In order to insure that the furnace wall be directly affected by the cooling medium and so accomplish a most thorough and efficient cooling, the furnace sheath or casing 2, may form one side of the trough, the other side consisting of a strip of metal attached to the wall and inclined to form a gutter or trough. I have shown the strip, 6, carried at intervals by bolts, 7, entering, but not passing through, the sheath, 2. In order that the cooling medium may not be confined in its effect to the spiral path formed by the trough I leave an opening along more or less of the bottom of the

trough so that part of the cooling medium may take a vertical path between the spiral course thus passing over and cooling the entire surface of the furnace wall. As shown in Fig. 2, this is accomplished by inserting washers, 8, on the supporting bolts between the strip, 6, and the furnace wall sheath, 2, so that, between the supporting bolts, the trough will be open at the bottom a width determined by the thickness of the washers.

In Fig. 2 three courses of the trough are shown. At *a*, the bolt and washer are shown attaching the strip to the sheath. At *b*, a portion of the trough intermediate the bolts is shown with the lip, 9, hanging straight down leaving a wide opening for the passage of the cooling medium. The strip, 6, or at least the lip 9, which may extend below the line of attaching bolts, is of thin material as it has little weight to support. It is thus possible to adjust the bottom of the trough or the lip, 9, toward or from the sheath, 2, and thus regulate the width of the opening along the bottom of the trough. At *c*, Fig. 2, I have shown the lip adjusted to leave a very narrow opening and it is obvious that the opening might be entirely closed. Of course, the adjustment may be the same throughout the length of the trough or it may vary from place to place as local conditions may require. The inconvenience and troubles incident to cinders and other impediments lodging in the trough are minimized and freedom and regularity of action are insured.

I claim as my invention:

1. In a furnace cooling device, a metal strip forming one side of a spiral trough, a furnace wall forming the other side of the trough, means for attaching the strip between its edges at intervals to the furnace wall and means at the points of attachment for holding the strip from contact with the furnace wall and allowing the portion of the strip below the line of attachment to be adjusted toward or from the furnace wall.

2. In a furnace cooling device, a spiral trough carrying the cooling medium surrounding the furnace and resting against the furnace wall and an adjustable lip for letting more or less of the cooling medium exit along the bottom of the trough against the furnace wall.

3. In combination a furnace in-wall comprising a metal sheath inclosing the brick lining, bolts entering the sheath but not passing through it, washers surrounding the bolts, a spiral strip of metal, supported between its edges at intervals on the bolts between their heads and washers, the upper portion of the metal strip being bent out to form a trough carrying a cooling medium between it and the sheath, the lower portion of the metal strip being adjustable so as to permit a variable amount of the cooling medium to pass between it and the sheath.

4. In a furnace cooling device, a spiral trough having an adjustable opening along its bottom.

5. In combination a furnace in-wall comprising a metal sheath inclosing the brick lining, bolts entering the sheath but not passing through it, washers surrounding the bolts, a spiral strip of metal, supported between its edges at intervals on the bolts between their heads and the washers, the upper portion of the metal strip being bent out to form a trough carrying a cooling medium between it and the sheath.

6. In a furnace cooling device, a trough having an adjustable opening along its bottom.

7. In a furnace cooling device, a metal strip forming one side of a trough, a furnace wall sheath forming the other side of the trough, bolts entering the sheath but not passing through it for attaching the strip at intervals to the furnace wall and means at the points of attachment for holding the strip from contact with the furnace wall.

8. In a furnace cooling device, a metal strip forming one side of a trough and adjustable toward or from the furnace wall intermediate its points of attachment, a furnace wall forming the other side of the trough, means for attaching the strip at intervals to the furnace wall and means at the points of attachment for holding the strip from contact with the furnace wall and allowing the portion of the strip intermediate the points of attachment to be adjusted toward or from the furnace wall.

9. In a furnace cooling device, a strip forming one side of a spiral trough, a furnace wall sheath forming the other side of the trough, and bolts entering the sheath but not passing through it for attaching the strip to the furnace wall.

Signed at Philadelphia, this 26th day of February, 1912.

FRANK C. ROBERTS.

Witnesses:
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CLARENCE S. BUTLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."