W. P. THORNTON.

BLAST FURNACE.

APPLICATION FILED JUNE 5, 1912.

1,167,729.

Patented Jan. 11, 1916.

FIG. 1

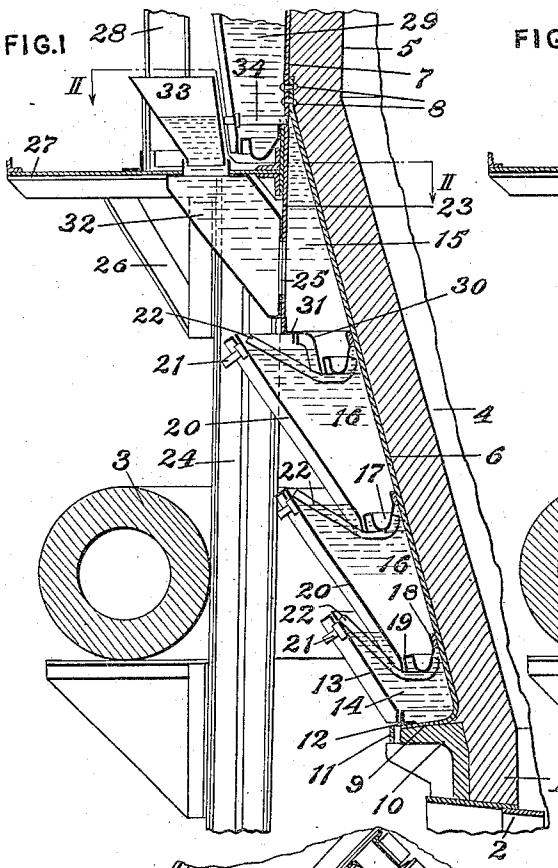


FIG. 3.

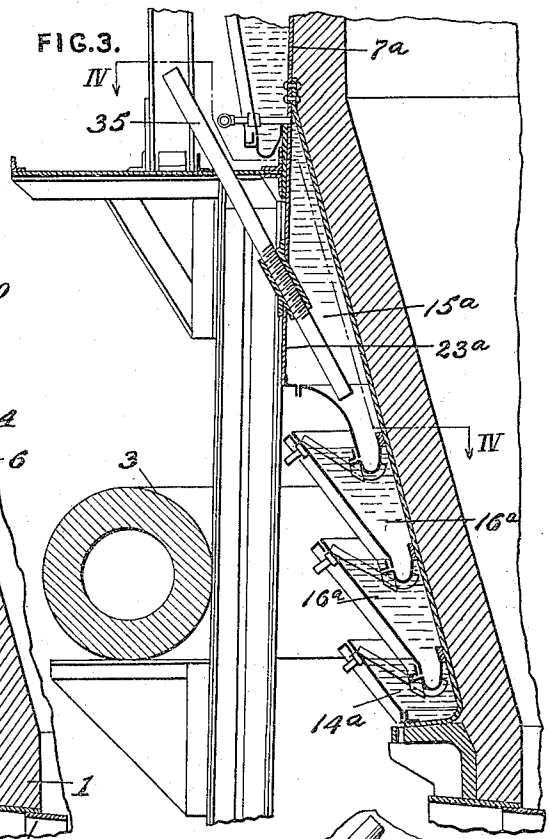


FIG. 2.

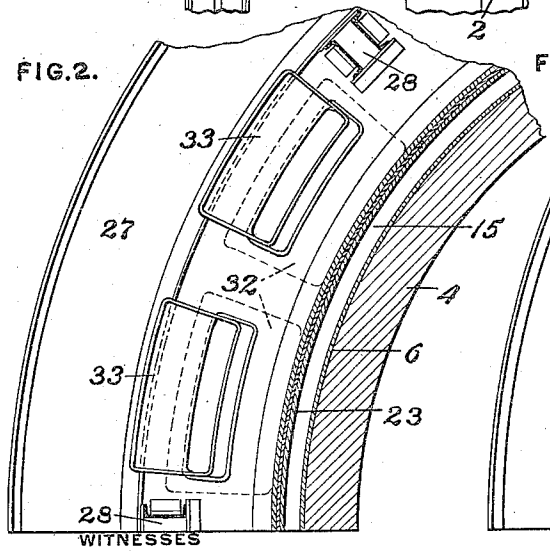
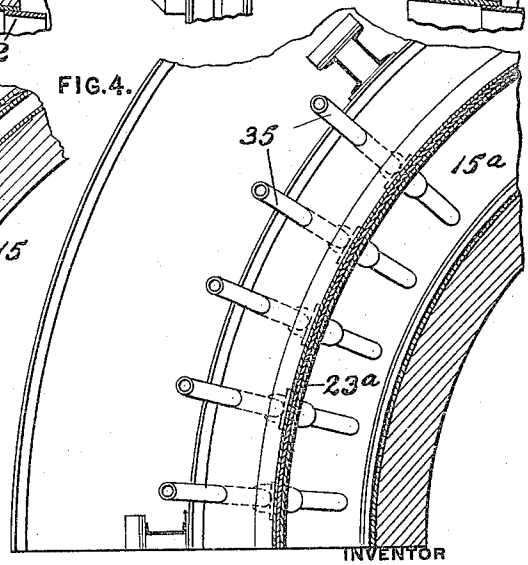


FIG. 4.



WITNESSES

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BLAST-FURNACE.

1,167,729. Specification of Letters Patent. Patented Jan. 11, 1916.

Application filed June 5, 1912. Serial No. 701,783.

To all whom it may concern:

Be it known that I, WILLIAM P. THORNTON, of Knoxville, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Blast-Furnaces, of which the following is a specification.

My invention relates to improvements in blast furnaces, and more particularly to blast furnaces having a comparatively thin refractory lining and outer metallic shells covering the refractory lining of both the bosh and upper body portions of the furnace.

Among the objects of the present invention are; to provide water cooled metallic shells for the bosh and upper body portion each having water troughs or receptacles of such construction as to prevent the dirt which accumulates in said troughs from interfering with the cooling action of the water; to provide a new and improved construction for the lower end of the bosh shell; to provide new and improved water cooled means located at the juncture of the bosh and upper body portion shells; and to provide water troughs of a character to permit ready access thereto for the purpose of removing foreign matter that may be caught in said troughs.

In the accompanying drawing, which illustrates applications of my invention, Figure 1 is a part elevational view and a part vertical sectional view through a portion of a blast furnace embodying my invention; Fig. 2, a part plan and a part sectional view, the section being taken on line II—II of Fig. 1 looking in the direction of the arrows; Fig. 3, a view similar to Fig. 1 showing a modified form of my invention; and Fig. 4, a part plan and a part sectional view of the modified construction, the section being taken on line IV—IV of Fig. 3 looking in the direction of the arrows.

Referring to the drawing, 1 designates a portion of the hearth of the furnace, 2 protected twyer openings extending through the wall of the hearth, the twyers, not shown, being in communication with a hot blast pipe 3 in the usual manner.

4 designates the bosh of the furnace, and 5 the upper body portion thereof. The refractory walls of the said bosh and upper body portions are comparatively thin, and are each respectively provided with metallic shells 6 and 7. The bosh shell 6 at its upper end is secured to the body shell 7 by means of a double row of rivets 8, and the lower end thereof is formed with an integral outwardly extending flange 9. By the employment of the integral flange 9 at the lower end of the bosh shell or on the lower section of the metallic plates constituting the bosh shell, I do away with the usual separable angle plate members heretofore employed at the lower end of the bosh shell, together with the rivets used for securing the bosh shell to the angles and their accompanying disadvantages.

Surrounding the hearth portion of the furnace and located directly below the lower end of the bosh shell is an annular member 10 through which the twyers pass, and 11 designates a band encircling the upper flange portion of the annular member 10. As illustrated, the integral flange 9 of the bosh shell rests on the upper surface of member 10. Secured to the outer edge of the flange portion 9 of the bosh shell, I provide a flanged member 12 designed to engage a flange of a plate 13 forming, in connection with the flange portion of the bosh shell and the upright portion thereof, a lower water trough 14.

15 designates a water containing box or compartment located at the juncture of the bosh and upper body portion shells, and 16 intermediate troughs located between the water containing receptacles 14 and 15. All of these troughs extend around the outer surface of the bosh shell and are of such construction as to permit of ready access thereto for examination and for cleaning. The constructions illustrated are also designed to prevent foreign matter caught by said troughs from banking up against the bosh shell and thereby interfering with the cooling action of the water contained in the troughs.

Another characteristic feature of the troughs 15 and 16 is, that the lower ends or bottom portions thereof are spaced away from the bosh shell in order to permit water to enter between the bosh shell and the lower ends of the troughs. Thus, referring first to the intermediate troughs 16, it will be noted that the bottoms thereof comprise a ring 17, preferably U-shaped in

cross-section with an inclined extension 18, the latter being designed to be riveted to the bosh shell. Ring 17 is preferably made up of a series of pressed plate members with the radial joints thereof welded together to present a smooth inner surface. In addition to the inclined extension 18 of the ring 17, the members constituting the ring are provided with a depending extension or flange 19. These flanges are secured to a series of plates 20.

21 designate overflows for the intermediate troughs, and 22 vent pipes in communication with the atmosphere and leading to the space between the inner side of the bottoms of the troughs 16 and the outer side of the bosh shell.

The body shell 7 surrounding the upper body portion of the furnace projects downwardly beyond the lower end of the said body portion and the extension 23 thereof is secured to and supported by a series of columns 24 extending upwardly from a suitable foundation; said columns are disposed in line with the outer surface of the wall of the upper body portion of the furnace. The extension 23 of the shell 7 is provided with a series of openings 25 for a purpose hereinafter described.

26 designates brackets secured to the upper ends of the columns and designed to support a horizontally disposed plate girder 27, which in turn supports a series of columns 28 extending upwardly from the bosh line of the furnace to the top of the upper body portion thereof. These columns 28 are designed to carry walks, etc., not shown.

In the drawing, I have shown only the lower end of the upper body portion of the furnace and only one water trough 29 in connection therewith. It should be understood, however, that I provide a series of annular water troughs extending to the top of the furnace and that said troughs are preferably of substantially the same construction as the intermediate troughs surrounding the bosh shell.

The water containing receptacle 15 comprises a bottom portion spaced away from the bosh shell and includes the ring 17 similar to the ring described in connection with the intermediate troughs. The ring of receptacle 15, however, is connected with a curved member 30, which latter is secured to the extension 23 of the upper shell 7 by an angle plate 31. Secured to the extension 23, and in communication with the compartment formed between the bosh shell and the extension 23, by means of an opening 25, is a box 32 having an open top extension 33.

34 designates an overflow pipe leading from the receptacle 15. By means of the construction just described, that is, the box 32 and opening 25, access to the upper trough of the bosh shell may be had for the purpose of removing any foreign matter therefrom.

In the form of my invention shown by Fig. 3, I show a different means for permitting access to the interior of the upper water receptacle 15^a. In this form, I employ a fixed pipe 35 extending downwardly through the extension 23^a of the upper body shell 7^a into the interior of the receptacle 15^a. This pipe is adapted to receive a hose or pipe, not shown, through which the accumulated dirt, etc., may be drawn or sucked from the interior of the receptacle. The troughs or receptacles 15^a, 16^a and 14^a, together with the other parts shown, are of substantially the same construction as the corresponding troughs and parts of the form of Fig. 1.

What I claim is:—

1. In a blast furnace, a metallic furnace shell, water troughs on the outer surface of said shell, said troughs each having a bottom of channel form in cross section and spaced away from the shell.

2. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell having its bottom including a member of substantially U-shape in cross section and having an inclined extension projecting from an edge thereof adapted to engage the shell.

3. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell having its bottom including a pressed plate member of substantially U-shape in cross section spaced away from the shell and having an inclined extension projecting from an edge thereof adapted to engage the shell.

4. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell having its bottom including a member of substantially U-shape in cross section and having an extension projecting from opposite ends thereof, the inner extension adapted to engage the shell, and the outer extension a member of the trough.

5. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell having its bottom including a member of substantially U-shape in cross section and having an inclined extension projecting from an edge thereof adapted to engage the shell.

6. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell having its bottom including a pressed plate member of substantially U-shape in cross section and having an inclined-extension projecting from an end thereof, and an extension projecting from the opposite end thereof, said extensions respectively engaging the shell and a member of the trough.

7. In a blast furnace, the combination

with an upper body shell, of supporting columns in line with the outer surface of the body shell, a metallic bosh shell, an outer and an inner water receptacle located at the juncture of the upper body and bosh shells, and means for permitting access through the outer water receptacle to the interior of the inner receptacle.

8. In a blast furnace, the combination with a metallic upper body shell, of a metallic bosh shell, an inner and an outer water receptacle located at the juncture of the upper body and bosh shells, and means for permitting access through the outer water receptacle to the interior of the inner receptacle.

9. In a blast furnace, the combination with a metallic upper body shell, of a metallic bosh shell, said upper shell having an extension extending below the upper end of the bosh shell, a water box located at the upper end of the bosh shell, and means for permitting access to the interior of the box through the extension of the upper body shell.

10. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell, said trough having a bottom spaced away from the shell and a vent pipe in the trough.

11. In a blast furnace, a metallic furnace shell, a water trough on the outer surface of the shell, said trough having a bottom of substantially U-shape in cross section spaced away from the shell, and a vent pipe leading to the space between the bottom and the shell.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM P. THORNTON.

Witnesses:
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F. E. GAITHER.

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