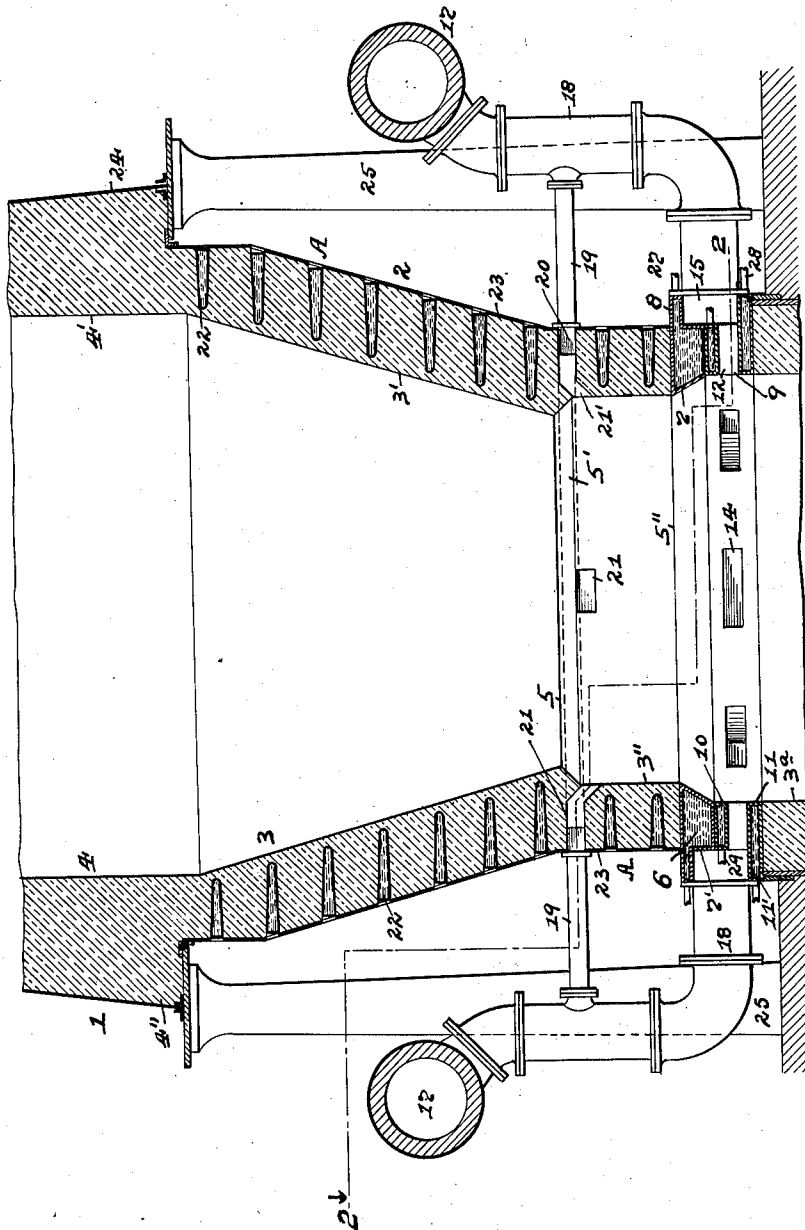


986,792.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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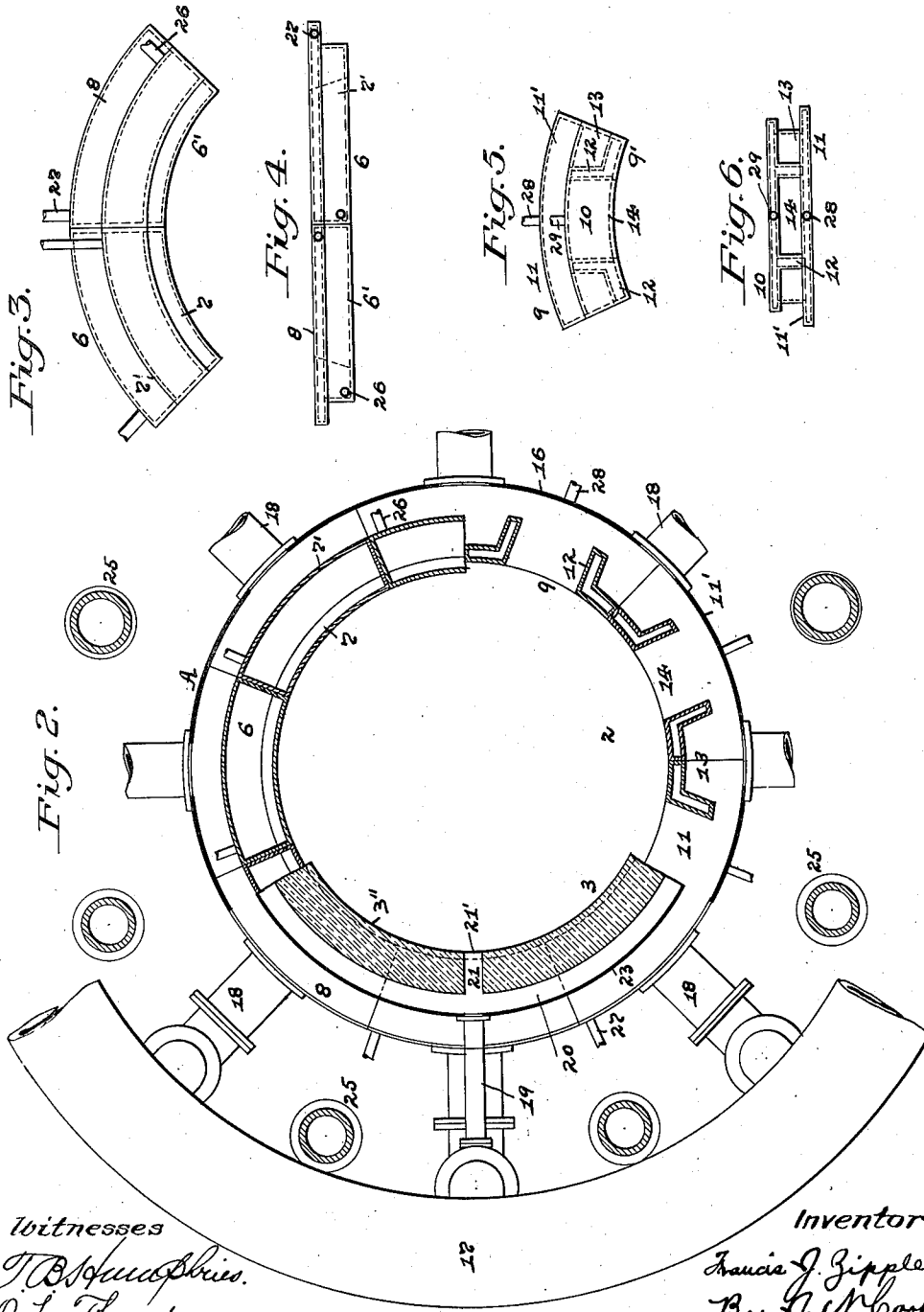
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F. J. ZIPPLER.
BLAST FURNACE.
APPLICATION FILED MAR. 7, 1910.

986,792.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FRANCIS J. ZIPPLER, OF AVALON, PENNSYLVANIA.

BLAST-FURNACE.

986,792.

Specification of Letters Patent. Patented Mar. 14, 1911.

Application filed March 7, 1910. Serial No. 547,661.

To all whom it may concern:

Be it known that I, FRANCIS J. ZIPPLER, a resident of Avalon, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Blast-Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to blast furnaces, and has special reference to the "bosh" of such furnaces.

The object of my invention is to provide a cheap, simple and efficient form of a bosh for a blast furnace in which the burning out of the same is reduced to a minimum, will provide for an increased output by such furnace, and will enable a reduction of the fuel consumption therein.

To these ends my invention consists, generally stated, in the novel arrangement, construction and combination of parts, as hereinafter more particularly set forth and described and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use my improved blast furnace, I will describe the same more fully, referring to the accompanying drawing, in which—

Figure 1 is a vertical section of the lower part of a blast furnace embodying my invention. Fig. 2 is a cross-section of the same on the line 2—2, Fig. 1, looking in the direction of the arrow. Fig. 3 is an inverted plan view of one of the segments employed in forming the inwardly extending water-jacket. Fig. 4 is an outer face view of the same. Fig. 5 is a top plan view of one of the segments employed in forming the twyer boxes. Fig. 6 is an outer face view of the same.

Like symbols of reference herein indicate like parts in each of the figures of the drawings.

As illustrated in the drawings, 1 represents the upper portion and 2 the bosh of the blast-furnace A, which bosh is provided with the lining or wall 3 having the inwardly tapered portion 3' extending from the straight vertical portion 4' of the wall 4 in said upper portion, and such linings are formed of the usual fire-brick construction. The lower end of the inwardly tapered wall portion 3' of the bosh-wall 3 is flared or tapered outwardly on its inner face, as at 5', in order to form the projecting portion 5 in

said wall, while the lower portion of said flared portion connects with a straight vertical portion 3'' in said wall and such flared portion and vertical portion are formed of the usual fire-brick construction.

Fitting under the vertical portion 3'' of the bosh-wall 3 is the hollow water jacket 6, which is formed of segmental sections 6, and preferably of cast metal, such as steel, while such jacket has the inner faces 7 on its sections flared outwardly from the inner face of said vertical portion, to form a projecting portion 5'' in said wall by said portion 3'' and such jacket is provided with the hollow flange portion 8 extending outwardly from their outer faces 7' at the upper ends of such sections and beyond the outer face of such vertical portion.

Fitting under the jacket 6 is the main twyer jacket portion 9, which rests on the lower vertical portion 3^a of the bosh-wall 3, and is formed of the segmental sections 9' preferably of cast metal, such as steel. The sections of the twyer portion 9 have the upper and lower sides of the same formed hollow, as at 10 and 11, and between such sides and at the ends of such sections are the vertical L-shaped hollow walls 12. These walls 12 are adapted to abut against each other on each end of the twyer sections 9' so as to form the pockets 13 between such ends and the main twyers 14 between such walls on each of said sections. The inner faces of the sides 10 and 11 and walls 12 on the twyer sections 9' are in line with the lower side of the outwardly flared faces 7 on the jacket sections 6' and the inner face of the wall portion 3^a, and the outer faces of said side 10 and said walls are in line with the outer faces 7' on said sections 6', while the outer portion of the side 11 extends beyond the side 10 and walls 11, so as to form the flange or projecting hollow portion 11' thereon, and the annular air chamber 15 between the portion 11' and the flange portion 8 on the sections 6' by the casing 16 fitting against said portions.

Extending exteriorly around the bosh 2 of the furnace A is the bustle or main air pipe 17, which is connected in the usual manner to the usual supply engine, and has the pipes 18 leading therefrom into the twyer chamber 15 at a point in line with the pockets 13 between the twyers 14. Pipes 19 also lead from the pipes 18 into an annular auxiliary air chamber 20 formed in the upper

part of the vertical portion 3'' in the bosh-wall 3, which chamber has the auxiliary twyers 21 leading therefrom into the furnace A below the flared portion 5', and are provided with the downwardly inclined portions 21 at the inner ends of the same.

The bosh 2 of the furnace A above the water jacket 6 has the usual bosh-plates 22 within the wall portions 3' and 3'' of the same, and the usual casing 23 surrounds such portions, while the usual casing 24 surrounds portion 4' of the upper wall 4, which wall extends beyond said bosh in the ordinary manner as at 4'', and is supported by the columns 25.

The water for the jacket 6 and its flange 8 enters at one end of the sections 6' through the inlet pipe 26 from any source of supply, and passes out through the outlet pipe 27 at the other end of such sections and from the flange 8 thereon. The water for the twyer portion 9 enters centrally of the lower side 11 on the sections 9' and through the projecting portion 11' thereon from the inlet pipe 28 connected to a source of supply and passes out from said twyer portion through the outlet pipe 29 leading centrally from the upper side 10 on said sections.

When it is desired to operate my improved blast furnace A to melt the materials therein a portion of the blast of air will pass from the main pipe 17 through the pipes 18 into the annular air chamber 15 formed by the jackets 6 and 9, and thence into the pockets 13 formed by the walls 12, where such air will be deflected by such walls, so that it will pass around the same and then pass through the twyers 14 into the furnace and below the projecting portion therein formed by the flared faces 7 on said jacket 6. At the same time a portion of the blast of air from the main pipe 17 will pass from the pipes 18 into the pipes 19, and thence into the annular air chamber 20 in the wall portion 3'', so that it can then enter the twyers 21 and be projected downward therefrom and into the furnace below the projecting portion 5' formed by the flared wall 5 on the wall 3' by the inclined portions 21 on said twyers. During this operation of the furnace A the water is circulated in the ordinary manner in the bosh-plates 22 in the wall portions 3' and 3'', and water is also circulated around the sides 10 and 11 and walls 12 of the twyer jacket 9 by the pipes 28 and 29, as well as around the jacket 6 and flange 8 thereon by the pipes 26 and 27.

It will thus be seen that by my improved blast furnace the large air chamber for the lower or main twyers will provide for a large twyer area, so that a large volume of air can be placed in said chamber, which will equalize the blast, and thereby form an even pressure of the blast as it passes

through each and everyone of such twyers into the furnace, while the upper or auxiliary twyers will also be provided with such a chamber to provide for such twyers working along the same lines and with the same result. By the use of the upper twyers in connection with the lower twyers the furnace will be prevented from scaffolding, and will also enable such furnace to economize in fuel and make an increased output therefrom. The construction of the bosh will also enable the walls of the same to be completely and thoroughly protected, which will prevent the burning out of said walls and the twyers within the same.

It will also be evident that much thinner walls can be used in the bosh of the furnace, which will thereby cheapen the cost of materials and maintenance of such bosh, and will thus enable them to be easier and more quickly repaired or renewed, when necessary.

It will further be obvious that my improved construction can be applied to furnaces other than the ordinary blast type, while various other modifications and changes in the design and construction of my improved blast furnace may be resorted to, without departing from the spirit of the invention, or sacrificing any of its advantages.

What I claim as my invention and desire to secure by Letters Patent is—

1. A furnace having its lining formed with a water jacket therein, water jacketed air twyers in said lining below said jacket and opening into the furnace, and an outer annular air chamber within and around said jacket and twyers for communicating with said twyers.

2. A furnace having its lining formed with a water jacket therein, water jacketed air twyers in said lining below said jacket and opening into the furnace, and an outer annular air chamber around said jacket and twyers and formed partly by said jacket and twyers for communicating with said twyers.

3. A furnace having its lining formed with a water jacket therein having an outer flange portion thereon, water jacketed air twyers in said lining below said jacket and opening into the furnace, said twyers having an outer flange portion thereon, and an outer annular air chamber around said jacket and twyers and formed by the flange portions on said jacket and twyers for communicating with said twyers.

4. A furnace having its lining formed with an inwardly projecting portion, a water jacket in said lining below said portion having a downwardly and outwardly flared inner face, water jacketed twyers in said lining below said jacket and opening into the furnace, and an outer annular air chamber around said jacket and twyers and

formed partly by said jacket and twyers for communicating with said twyers.

5 5. A furnace having its lining formed with an inwardly projecting portion, a water jacket in said lining below said portion having a downwardly and outwardly flared inner face and an outer flange portion thereon, water jacketed air twyers in said lining below said jacket and opening into
10 the furnace, said twyers having an outer flange portion thereon, and an outer annu-

lar air chamber around said jacket and twyers and formed by the flange portions on said jacket and twyers for communicating with said twyers.

In testimony whereof, I, the said FRANCIS J. ZIPPLER, have hereunto set my hand.

15

FRANCIS J. ZIPPLER.

Witnesses:

J. L. TREFALLER, Jr.,

J. N. COOKE.