

(No Model.)

2 Sheets—Sheet 1.

J. W. NESMITH.
BLAST FURNACE.

No. 507,031.

Patented Oct. 17, 1893.

Fig. 1.

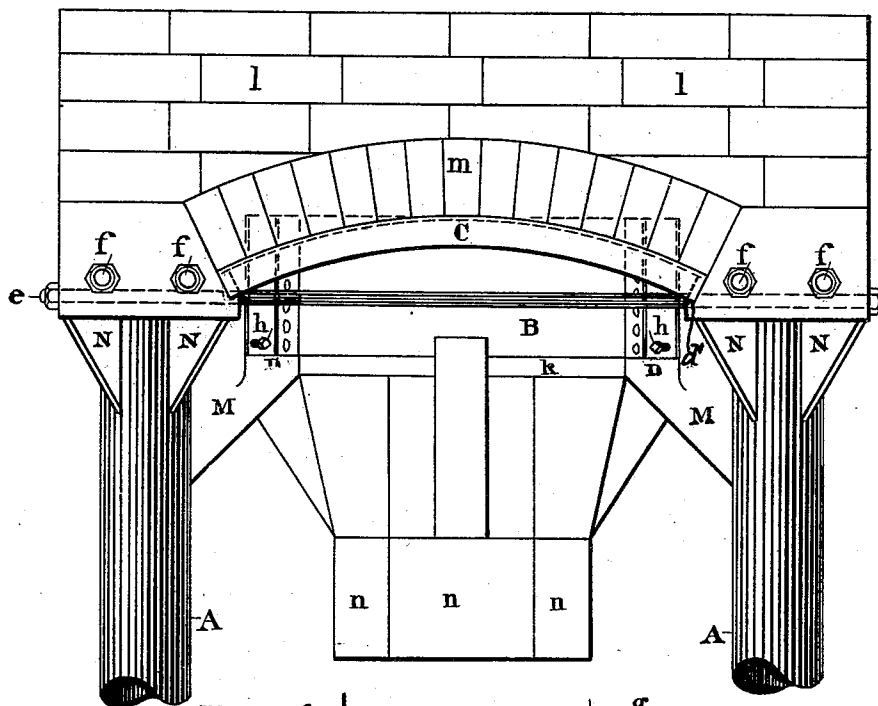
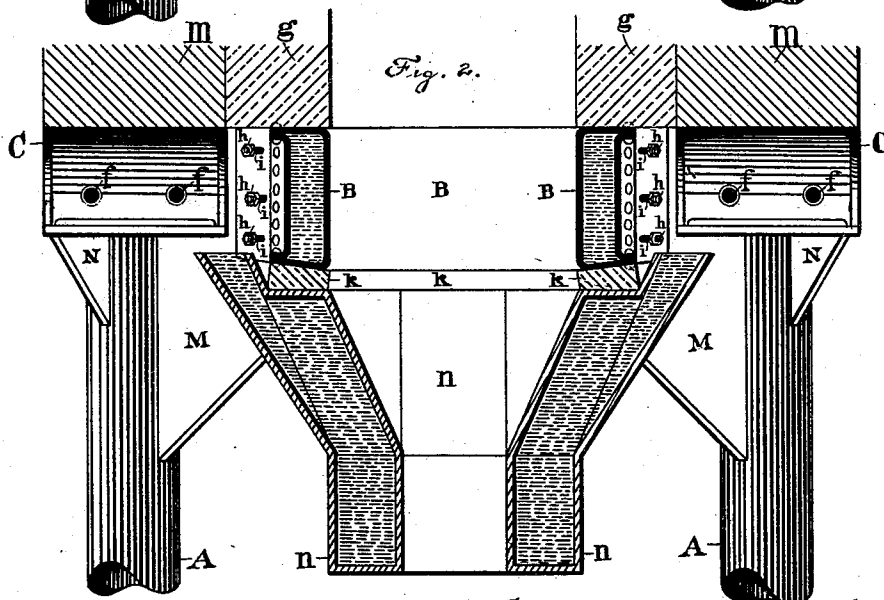


Fig. 2.



Witnesses

Fredrick T. Snyder
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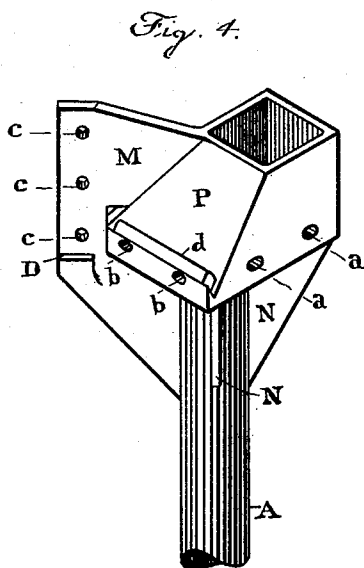
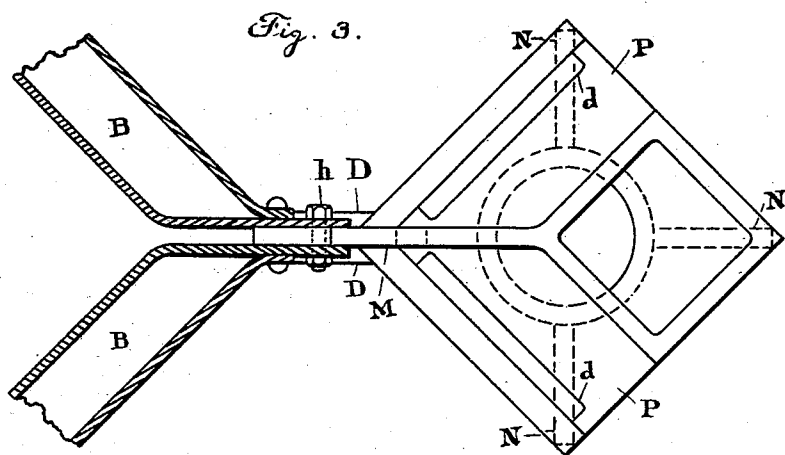
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John W. Nesmith

Inventor

Witnesses

Fredrick T. Snyder
F. W. Gross

UNITED STATES PATENT OFFICE.

JOHN W. NESMITH, OF DENVER, COLORADO, ASSIGNOR TO THE COLORADO
IRON WORKS, OF SAME PLACE.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 507,031, dated October 17, 1893.

Application filed March 24, 1893. Serial No. 467,458. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. NESMITH, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Blast-Furnaces, of which the following is a specification.

The object of the present invention is to provide a new and improved construction of blast furnace which will render the metal work supporting the brick stack less liable to fail through the attacks of the fire; further to avoid the weakening and rupture of the brick lining at a point just above the sectional water jackets which form the lower zone of the furnace; and still further to provide a ready and convenient access to such protecting devices.

The invention consists of a furnace having a frame of arched plates mounted on columns and supporting the brick work of the stack.

The invention further consists of a frame of arched plates mounted on columns and supporting the brickwork with a frame of water jackets also supported by said columns.

The invention also includes the details of construction which are hereinafter described and particularly pointed out in the claims, and illustrated in the accompanying drawings, in which similar letters of reference indicate corresponding parts in all the figures, in which—

Figure 1 is a side elevation of a blast furnace constructed in accordance with my invention. Fig. 2 is a central vertical section through the same. Fig. 3 is a plan view of one of the supporting posts illustrating the method of securing the water jackets thereto, and Fig. 4 is a perspective view of one of the supporting columns.

In the figures the arched plates are shown at C, these being preferably constructed of wrought-iron channel beams, supporting, in part, the brick wall *l, l*, of the furnace stack. The ends of the arched plates about as shown against the tops of the columns A, A, and the lateral thrust of the arches is neutralized by the tie rods *e, e, f, f*, extending between opposite faces of the furnace walls.

The tops of the supporting posts or columns, A, A, of which there are four, one at

each corner, are enlarged as shown more clearly in Figs. 3, and 4, and provided with the inclined faces P which terminate in the flanges *d'* at the lower edge upon which the ends of the arched plates rest. To provide further support for the arched plates the inclined faces are recessed as shown at *d*, into which recesses the correspondingly formed ends of the arched plates project, thus preventing any side displacement. The inclined faces P, form seats for the end bricks of the arch *m*. Suitable perforations are formed through the columns as at *a, a*, and *b, b*, through which the tie rods *e*, and *f*, pass, the tie rods being provided with suitable nuts by means of which they may be adjusted and fastened securely to the columns. The adjustment in the length of the rods due to the nuts will allow any distortion of the brick stack from unequal heating to be rectified.

Within the arched plates and supported by extensions from the columns is a water jacket B, which is so placed as to form an upward extension of the sectional water jackets *n, n*, forming the lower zone of the furnace, these sectional water jackets being of the usual and well known construction. The water jacket B, is designed to protect the arched plates C, from the heat of the furnace, and is preferably constructed of wrought iron or steel arranged to have all riveted seams shielded from the direct heat of the furnace. The ends of the water jackets are supported by a web M projecting from the side of the columns, to which web the flanged ends of the water jackets are bolted as shown in detail in Fig. 3, the lower edge of the water jacket or flange resting on a lug D projecting from each side of the web.

The holes *i*, in the flange are formed elongated as shown in Figs. 1 and 2 in a direction parallel with the greatest length of the water-jacket B, to allow for the expansion and contraction of the water-jacket due to the changes in the temperature of the jacket and the adjacent parts of the furnace. This expansion or contraction is rendered possible by the peculiar form of the water jacket as shown in Fig. 3, in which it will be observed that the end of the water jacket B is formed inclined or beveled at an angle of forty-five degrees, so

that any change in its length simply results in a movement out or in from the center of the furnace, and has no effect of distortion or strain on adjacent jackets, or on the columns.

- 5 The water jackets B are provided with any suitable system of piping or troughs to remove the heated water and substitute cold water therefor, in the operation of the furnace. The arching of the plate C, allows a
10 free inspection of, and access to the water jackets B, and such a combination of arch plate and water jacket applied to each side of a furnace forms a closed and complete protecting frame. As will be observed in Fig. 2
15 the water jackets serve to support in part the inner lining *g, g*, of the stack.

I claim as my invention—

1. A blast furnace comprising the supporting columns, a frame of arch plates abutting
20 on said columns, tie rods connecting said columns, and the stack supported on said arches and columns substantially as described.

2. A blast furnace comprising the stack the supporting columns having enlarged upper
25 ends with inclined faces provided with supporting ledges, arched plates supported on said ledges, and tie rods extending through openings in the columns and counter-acting the thrust of the arches, substantially as described.
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3. In combination the stack the supporting columns the arch plates supported thereon, and the protecting water jackets also supported by the columns within the arched
35 plates, substantially as described.

4. In combination the stack the supporting columns, the arched plates supported thereon, and the protecting water jackets supported within the arch plates, the ends of said
40 jackets having longitudinal movement to allow expansion and contraction of the jackets, substantially as described.

5. In combination, the stack the supporting columns having enlarged upper ends with
45 inclined faces, arch plates abutting on said faces, tie rods connecting the columns and counteracting the thrust of the arch plates, vertical webs carried by the columns and extending within the arch plates, and protecting
50 water jackets carried by said webs, substantially as described.

6. In combination, the stack the supporting columns, arch plates abutting thereon, vertical webs carried by the columns extending
55 within the arch plates, lugs projecting from the webs, and protecting water jackets

having their ends resting upon the said lugs, with sliding connections between said ends and the webs, substantially as described.

7. In combination the stack the supporting columns, arch plates carried thereby, vertical webs carried by the columns extending within the arch plates, protecting water jackets having beveled or inclined ends fitting the webs, with a sliding connection between
65 said beveled ends and webs, substantially as described.

8. In combination the stack the supporting columns, arch plates carried thereby, vertical webs carried by the columns extending
70 within the arch plates, protecting water jackets having beveled ends abutting the vertical webs and terminating in a flange, horizontally elongated openings in said flange, and bolts passing through said elongated openings and through holes in the web, substantially
75 as described.

9. In combination, the stack, the columns supporting the same, the water jacket supported from the columns, and the inner lining of the stack supported by the water jacket, substantially as described.
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10. In combination, the stack, the columns, the arched plates between the columns and supporting the stack, and water jackets interposed between the plates and the interior of the furnace, substantially as described.
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11. In combination the stack comprising the brick work, the arch brick work *m*, the arch-plate C, the water jacket arranged between the plates C and below the stack and the columns A. A, having bearings at their upper ends for supporting the brick work, the water jackets and the arched plates, substantially as described.
95

12. In combination the stack comprising the brick work, the arch brick work, the arch plate supporting the arch brick work, the water jackets arranged between the arch plates and below the stack, and the columns
100 supporting the stack, said columns having enlarged hollow upper ends with a flat bearing for the brick work and inclined bearing face for the arch plates and brick work, and webs for supporting the water jackets, substantially as described.
105

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

JOHN W. NESMITH.

Witnesses:

F. D. GROSS,

FREDERICK T. SNYDER.