

No. 853,698.

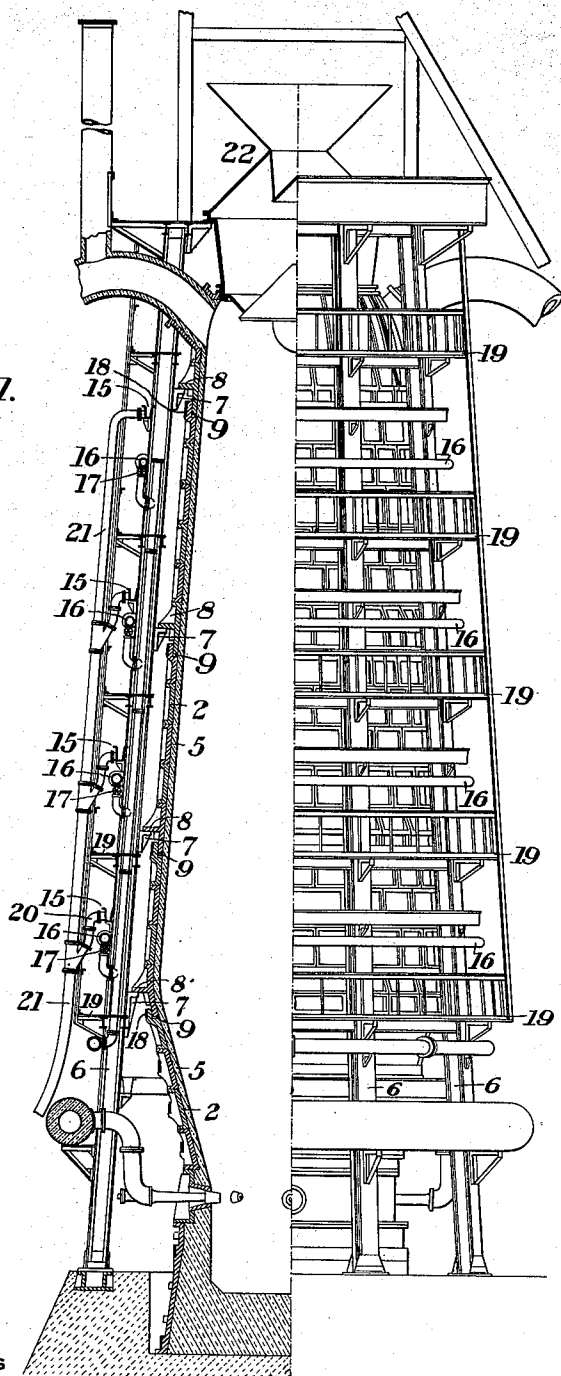
PATENTED MAY 14, 1907.

J. L. HUNTER.
STACK FURNACE CONSTRUCTION.

APPLICATION FILED NOV. 12, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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W. W. Swartz

INVENTOR

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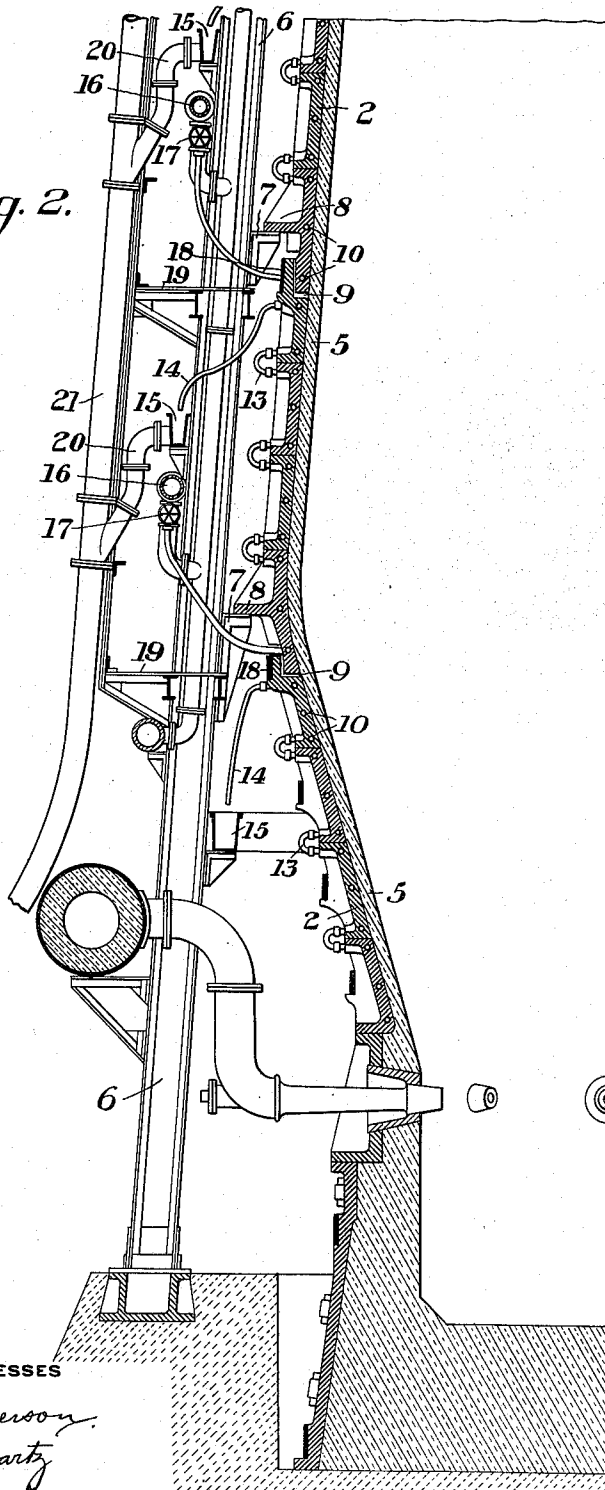
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

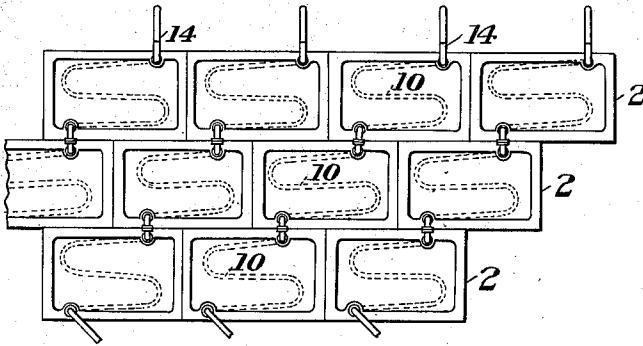


Fig. 4.

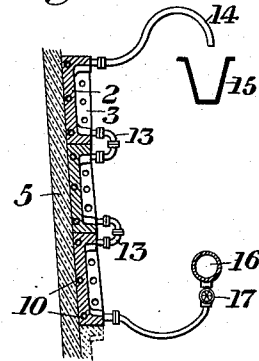


Fig. 5.

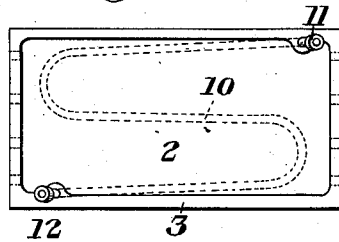


Fig. 6.

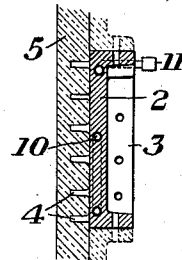
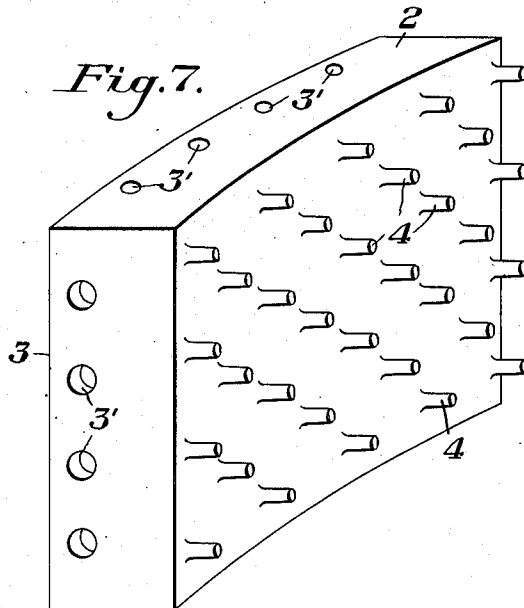


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOSEPH L. HUNTER, OF ROANOKE, VIRGINIA.

STACK-FURNACE CONSTRUCTION.

No. 853,698.

Specification of Letters Patent.

Patented May 14, 1907.

Application filed November 12, 1906. Serial No. 342,944.

To all whom it may concern:

Be it known that I, JOSEPH L. HUNTER, of Roanoke, Roanoke county, Virginia, have invented a new and useful Stack-Furnace Construction, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation, one half in section, showing my invention as applied to a blast furnace; Fig. 2 is an enlarged partial vertical section; Fig. 3 is a front elevation showing the arrangement of the ring segments and their connections; Fig. 4 is a cross section of Fig. 3; Figs. 5 and 6 are enlarged detail views of one of the plates or segments; and Fig. 7 is an enlarged perspective view of the same showing the projections for holding the lining.

My invention relates to the construction of stack furnaces, such as cupolas, blast furnaces, and other smelting furnaces.

The object of the invention is to provide a strong efficient structure which will provide for supporting the same on structural framework at different points in its height.

A further object of the invention is to enable the furnace to be cheaply and easily lined with refractory material in a plastic form, and also to provide for an efficient water circulation.

In the drawings, I show a blast furnace composed of a series of superimposed rings, each ring formed of cast iron segment plates 2, as shown in the detail Figs. 3 to 7 inclusive. These segment plates are preferably cast with a surrounding flange or rib 3 by which they may be bolted together at both top and bottom and sides through the bolt holes 3'; and are provided on their inner faces with integral prongs or projections 4. All or part of the rings may be formed with these projections, but I prefer to so form all of the plates above the level of the tuyers. The lining of refractory material is applied to the inner faces of these plates having the projections, the projections serving to hold the refractory lining 5 in place, as shown in the drawings. The lining may thus be easily and cheaply applied, and will be securely held in position.

Surrounding the wall of the furnace is a structural frame-work having vertically-extending columns 6, of which there may be any desired number around the circumference of the furnace. These columns are

at different levels with brackets 7 which engage projecting flanges 8 cast integral with some of the rings or plates. I have shown four of the superimposed rings as forming one section or belt, the lower-most ring of each section having the flange 8 which is carried upon the surrounding structural work. This lower-most ring of each belt preferably interfits with the upper ring of the next lower belt by forming the top ring of the next lower section with an annular recess, as shown at 9 into which the bottom ring of the next section above will enter, thus forming an expansion joint between the sections or belts. Each circular section of the wall is preferably provided with its own cooling system which may be formed in any desirable way. I prefer, however, to cast circulating pipes 10 in each plate, these circulating pipes having connections 11 and 12 near the opposite corners for the U-shaped connector pipes 13 between the several segments. From the outlets at the top of each section of the furnace, pipes 14 discharge into surrounding troughs 15, the water entering from the supply pipes 16 into the lower ring of each section. I do not desire to limit myself, however, to this arrangement of pipes or passages formed in the castings, since sprays or jets of water or other cooling systems may be employed.

The circular water supply pipes 16 are preferably independent of each other and the fluid to each section may be controlled by hand valves 17 in the pipes connecting the mains to the cooling system of each section.

In order to strengthen the sections, I preferably reinforce the top of each section by an encircling band 18 formed of steel or wrought iron, this band extending around the furnace and binding the plates against outward movement or distortion. Each section is preferably provided with a platform 19 which is built on the surrounding structural frame-work, thus giving easy access for adjustment of the water supply to each section, or repairs to the parts. Suitable communication may be had between the platforms at different levels by means of ladders or other suitable communication.

The waste troughs 15 may be connected by pipes 20 to the general waste pipe 21 which extends vertically along one side of the furnace.

The hopper system 22 and the top work of the furnace may be supported upon the

surrounding structural frame-work containing the vertical column 6, thus taking this weight off the furnace body proper.

The advantages of my invention result from supporting the rings forming the wall at different levels through the height of the furnace; also from forming the wall of rings or circular sections which are easily removed and replaced. The interfitting arrangement of one section with the next assists in holding the sections in proper position, while allowing expansion and contraction. The exterior independent structural work serves to support the furnace wall, and may also be used to support the bell system and the top work. The cooling of the several sections is easily controlled independently of the others, and all parts are easily accessible. The use of the prongs or projections on the inner faces of the plates enables the lining to be easily and cheaply applied in plastic form. This also prolongs the life of the furnace and assists in preventing the burning away or cutting out of the lining. With my construction also, the lining may be quickly and thoroughly dried by circulating steam through the coils of the plates prior to starting the furnace.

Many variations may be made in the form and arrangement of the furnace and its parts without departing from my invention.

I claim:—

1. A stack furnace of varying cross-sectional areas at different levels having above the mantle a metallic jacket composed of annular sections, and exterior structural frame-work around the furnace supporting some of said sections; substantially as described.
2. A stack furnace of varying cross-sectional areas at different levels, and having a metallic jacket composed of annular sections with internal projections, a plastic lining molded in contact with said projections above the mantle level, and exterior structural frame-work independent of the furnace proper and having supports for sections of the jacket above the mantle; substantially as described.
3. A stack furnace of varying cross-sectional areas at different levels having above the mantle a metallic jacket composed of annular sections, some of said sections being supported upon exterior structural frame-work; substantially as described.
4. A stack furnace of varying cross-sectional areas at different levels having a metallic jacket formed in circular sections and columns arranged around the furnace and extending above the mantle, said columns having above said level brackets to support the sections; substantially as described.
5. A stack furnace of varying cross-sectional areas at different levels having above

the mantle level a metallic jacket formed in circular sections with expansion joints between said sections; substantially as described.

6. A stack furnace of varying cross-sectional areas at different levels having above the mantle level a metallic jacket formed in circular sections with expansion joints between said sections, and exterior structural frame-work extending above the mantle level and arranged to support the sections; substantially as described.

7. A stack furnace of varying cross-sectional areas at different levels having a metallic jacket extending upwardly from the mantle level and formed of circular sections, each section composed of separate plates secured together, means for cooling said plates, and an exterior structural frame-work extending above the mantle level and arranged to support the sections at different levels; substantially as described.

8. A stack furnace of varying cross-sectional areas at different levels having a metallic jacket extending upwardly from the mantle level and composed of circular sections supported on exterior frame-work extending above the mantle level and separate water cooling sections for each circular section; substantially as described.

9. A stack furnace of varying cross-sectional areas at different levels having a metallic jacket extending upwardly from the mantle level and formed in circular sections and arranged to allow expansion and contraction between the sections, a hopper and an exterior structural frame-work arranged to support the hopper and top work; substantially as described.

10. A stack furnace of varying cross-sectional areas at different levels having a complete inclosing metallic jacket formed of separate water-cooled circular sections, said sections having internal projections arranged to support the lining, and exterior structural frame-work arranged to support the sections at their different levels; substantially as described.

11. A stack furnace of varying cross-sectional areas at different levels having a complete inclosing metallic jacket formed of separate water-cooled circular sections, said sections having internal projections arranged to support the lining, exterior structural frame-work arranged to support the sections at their different levels; and surrounding bands for the sections; substantially as described.

In testimony whereof, I have hereunto set my hand.

JOS. L. HUNTER.

Witnesses:

JOHN M. HART,
CLAYTON I. HART.