J. SCOTT.

BLAST FURNACE.

APPLICATION FILED MAY 3, 1910.

964,885. Patented July 19, 1910.

FIG. 1

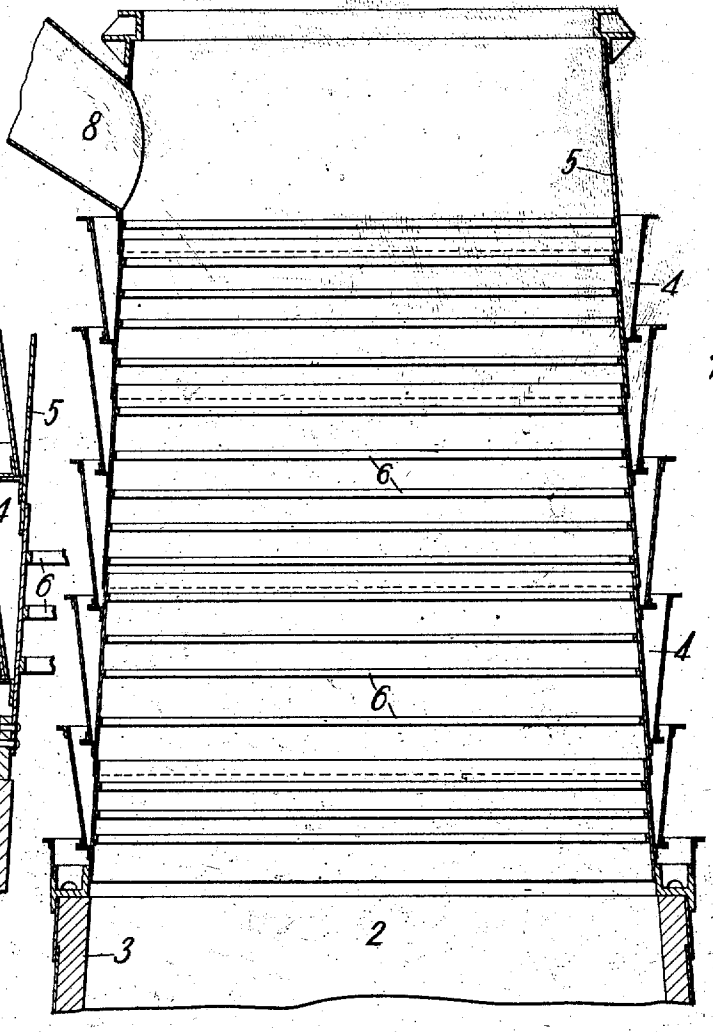


FIG. 2

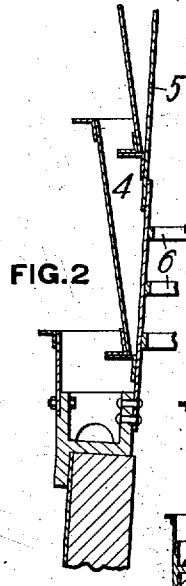


FIG. 3

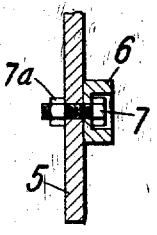


FIG. 4

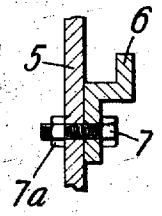
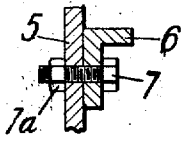


FIG. 5



WITNESSES

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BLAST-FURNACE.

964,885. Specification of Letters Patent. Patented July 19, 1910.

Application filed May 3, 1910. Serial No. 559,098.

To all whom it may concern:

Be it known that I, JAMES SCOTT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Blast-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the construction of blast furnaces and more particularly relates to the construction of the upper end of the shaft of such furnaces.

One of the objects of my invention is to provide a blast furnace having its upper part constructed without the usual refractory lining and having means by which abrasion of the inner metal surface is overcome and prevented.

It has been proposed to construct a blast furnace in which the refractory lining is dispensed with in the upper part of the furnace shaft. With such constructions as heretofore made the abrasion of the stock descending in the furnace cuts away the metal lining to such an extent that its use is practically prohibited on account of the short life of such metal shells.

Referring to the drawings, Figure 1 is a sectional elevation showing the upper part of the shaft of a blast furnace. The bell, hopper and other top gear of the furnace, not forming part of this invention, is omitted for the sake of clearness. Fig. 2 is a sectional detail on a larger scale showing the connection between the part of the furnace shaft having a refractory lining and the upper unlined portion in which a refractory lining is not employed. Fig. 3 is a sectional detail on a larger scale showing the annular rings on the furnace shell in the interior of the furnace located and arranged in accordance with my invention. Fig. 4 is a similar sectional detail showing a modified form of ring construction. Fig. 5 is a sectional detail similar to Figs. 3 and 4 showing a further modification in the construction of the rings.

In the drawings, 2 represents the shaft of a blast furnace having a refractory lining 3 which extends upwardly in the furnace to a point above the furnace bosh and intermediate of the top and bottom of the furnace shaft. The shaft of the furnace above the part provided with the refractory lining is shown as a built-up structure formed of heavy rolled metal plates which are securely riveted together. On the outside of the shell formed by the plates is a series of annular water troughs 4, the outer surface of the metal shell 5 forming one side of these troughs.

Secured on the interior of the unlined portion of the furnace shell and located at suitable intervals in the height thereof, is a series of rings 6. These rings are shown as encircling the interior of the furnace, although they may not be continuous and may extend only partly around the furnace, when desired.

It is important that water in the troughs 4 is prevented from leaking into the furnace and for this reason the joints between the plates forming the shell are calked and the bolts 7 which secure the rings 6 in place are screw threaded into the plates of the shell 5, with a locking nut 7^a on their outer ends, and if desired, a gasket is placed between the adjoining surfaces of the plates and the nuts 7^a.

Water is supplied to the upper trough 4 and the water is led by the overflow pipe from the troughs into the next lower trough, finally reaching the water trough on the top of the lined shell portion of the furnace from which point it is led through a suitable discharge pipe to a point of disposal.

In the operation of a blast furnace constructed in accordance with my invention, the furnace is charged, the gases are led from the furnace through branches 8 connecting the furnaces with the downcomer and the furnace is tapped in the usual manner. The furnace is kept filled with burden forming materials, the stock line being about the level of the bottom of the outlet opening or openings 8, the stock continually descending into the furnace and fresh materials being constantly supplied to maintain the stock line at this level.

As the stock descends in the furnace the finely divided materials forming the major portion of the furnace burden will enter the spaces between the rings 7 on the interior of the furnace and the upper edges of the rings 7 will hold or maintain a thin annular layer of such materials in position. The thin layer of stock kept in contact with the furnace shell forms a protecting wall, the descending column of fuel in this way being prevented from contacting with and wearing away the unlined plates of the furnace

shaft and providing an effective means for lengthening the life of such unlined shells.

The advantages of my invention will be apparent to those skilled in the art. By the use of the baffles on the inner surface of the furnace shell, the heretofore destructive wear caused by the constantly descending column contacting with the surface of the plates forming the furnace shell is overcome and prevented. The use of screw threaded bolts with threaded openings in the furnace shell maintains tight joints and effectively prevents leakage of the cooling water into the furnace through the bolt holes. The construction is simple and is easily kept in repair.

Modifications in the construction and arrangement of the parts may be made without departing from my invention. The water troughs on the outside of the furnace shell may be dispensed with, the shape and the number of the rings may be varied, and other changes may be made without departing from my invention.

I claim:

1. A blast furnace having a metallic shell, a portion thereof being unlined and means on the inner surface of said unlined shell portion arranged to act as baffles and retard the descent in the furnace of materials in contact with the shell; substantially as described.

2. A blast furnace having a partly unlined metallic shell, and a series of baffles on the unlined interior of said shell adapted to engage with and retard the descent of materials in said furnace contacting with the shell; substantially as described.

3. A blast furnace having a metallic shell, a refractory lining for part of the shell and a series of rings on the unlined inner surface of the shell adapted to retard the downward movement of materials in contact with the inner surface of the shell; substantially as described.

4. In a blast furnace a metallic furnace shell, water troughs on the outer surface of said shell, a ring on the inner surface of the shell and a plurality of tap bolts securing the ring in place on the shell, said bolts being screw threaded into the bolt holes in the shell; substantially as described.

5. In a blast furnace a metallic furnace shell, water troughs on the outer surface of said shell, a series of separated rings on the inner surface of the shell and a plurality of tap bolts securing the rings in place on the shell, said bolts being screw threaded into the bolt holes in the shell and rings; substantially as described.

In testimony whereof, I have hereunto set my hand.

JAMES SCOTT.

Witnesses:
J. P. Collins,
George H. Smith.