E. B. COOK.

BLAST FURNACE.

APPLICATION FILED JULY 1, 1909.

936,308. Patented Oct. 12, 1909.

Fig. 1.

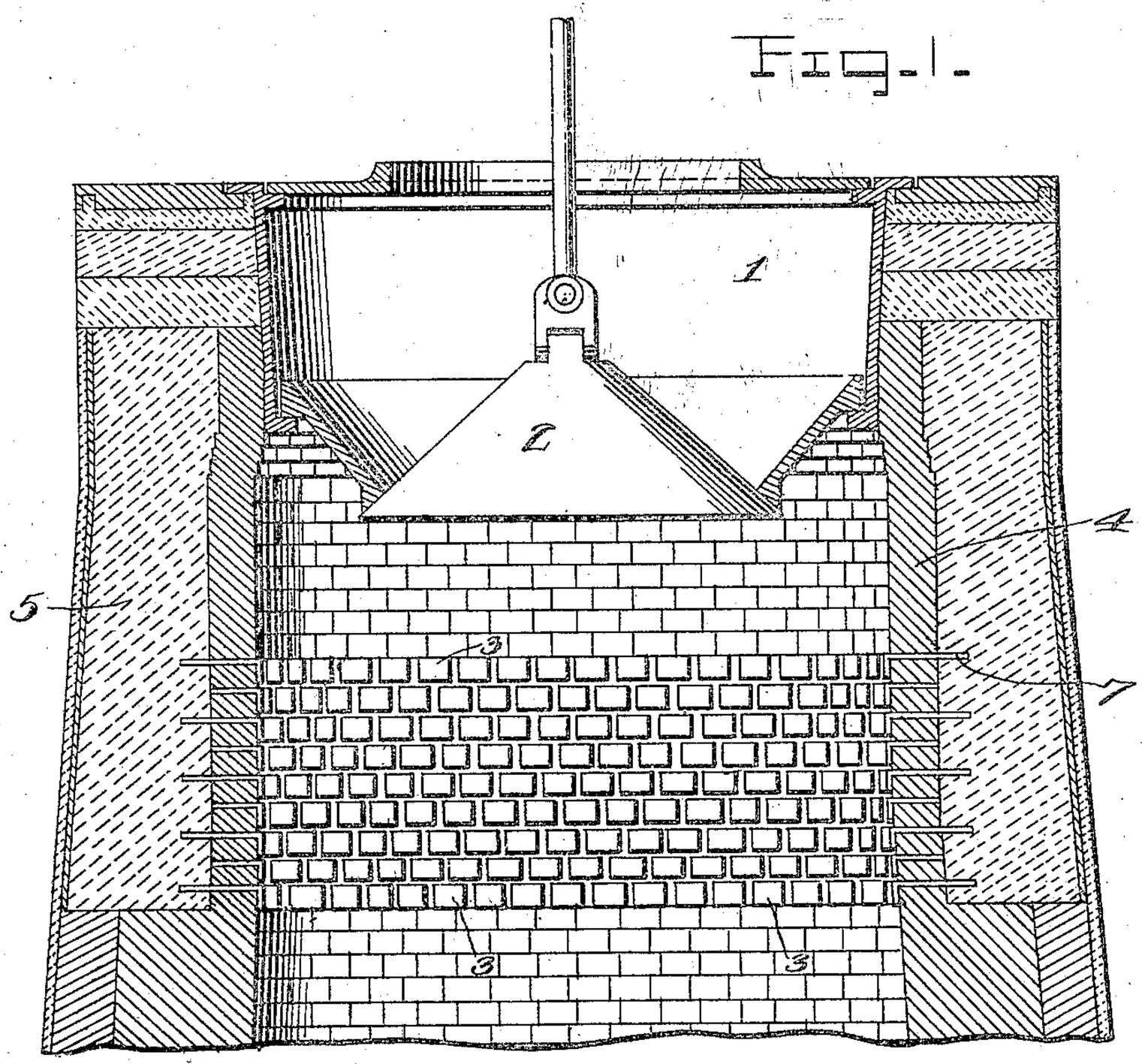
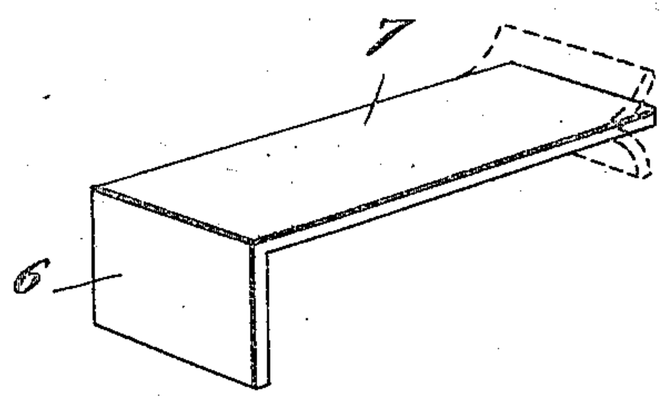


Fig. 2.



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BLAST-FURNACE.

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To all whom it may concern:

Be it known that I, EDWARD B. COOK, a citizen of the United States, residing at Pottstown, in the county of Montgomery and State of Pennsylvania, have invented new and useful Improvements in Blast-Furnaces, of which the following is a specification.

This invention relates to improvements in blast furnaces and more particularly to the construction of the top of the furnace.

In supplying the stock to the furnace it is customary to deposit the same first in a hopper arranged above the top of the furnace. To evenly distribute the contents of the hopper within the furnace the bottom is closed by a conical bell. When the bell is lowered the stock will be discharged from the hopper and the conical sides of the bell will deflect the stock so that it strikes the sides of the furnace. It has been found that the continual impact of the stock upon the upper sides of the furnace has a deteriorating effect and will in time wear away the lining.

It is the object of this invention to provide a protection for the lining at this point of the furnace which will not be affected by the heat and peculiar properties of the furnace gases, as well as resist the continual concussion caused by the impact of the stock from the hopper.

While the preferred form of this invention is illustrated upon the accompanying sheet of drawing, yet it is to be understood that minor detail changes may be made without departing from the scope thereof.

Figure 1 is a vertical section taken through the center of the upper portion of a blast furnace to which this invention has been applied. Fig. 2 is a perspective view of a detail.

Fig. 1 illustrates the top of a blast furnace provided with the usual hopper 1 and bell 2. When the bell is lowered the stock will be deflected outward against the inner walls of the furnace. This invention provides for a series of small plates 3 arranged in parallel rows around the inner lining of the walls about the point of impact. The inner lining 4 from the lowermost point of this protection or armor to the top of the furnace is composed of fire bricks set in fire clay or cement. For reasons hereinafter stated this portion of the lining 4 is composed of one thickness of brick and to prevent the same from being crumbled or displaced by the falling of the stock thereon, a backing of concrete 5 is provided.

Fig. 2 is an enlarged view of one of the plates 3 forming the protective belt. As seen this plate consists of a rectangular body 6 provided with an elongated projection 7 extending at right-angles thereto. These plates are mounted between the layers of fire brick in the lining 4, in the manner shown in Fig. 1, with the elongated projections 7 extending between the bricks. To anchor the plates in place it is preferable that the projections extend through the fire brick and into the concrete backing 5, as shown in Fig. 1. Each plate 3 in each series may be secured in this manner, or every other plate may be anchored in the concrete, while the projections on the alternate plates extend only between the fire bricks. To provide an additional anchor for the plate, the projections which extend in the concrete may be split at their inner ends and bent away from each other as shown in dotted lines in Fig. 2. The protecting plates are subjected not only to the great strain occurred by the contact of the stock continually falling upon the same, but are also subjected to the effect of the furnace gases. By arranging a series of small plates spaced apart from each other as shown, sufficient allowance is made for expansion, contraction, or twisting of the plate caused by the excessive heat without affecting the general structure.

It has been found that high carbon steel is the only material that will successfully resist the peculiar action of the hot furnace gases. Low carbon steel and cast iron which are the available metals for this purpose under the great heat at this point in the furnace, will absorb carbon from the gases and cause this material to swell and disintegrate. It is therefore very important that these plates be made of the highest form of carbon steel that can be rolled in the mills.

Considering the difficulties confronting a protective lining to the inner walls of the furnace at this point, the advantages of this invention will be readily appreciated. By constructing this part of the inner wall of one thickness of fire brick with a backing of concrete an anchorage is formed for the plates, which not only secures the plates in position but also retains the fire brick lining. The construction of the plates of high carbon steel, each plate presenting by itself but a small surface upon the interior of the fur-

nace, and by spacing the plates apart and arranging them in staggered rows the hot furnace gases or the falling stock gases will have little or no effect upon any separate plate. The life of the furnace is greatly prolonged by the protective lining, the other advantages of this construction are obvious.

What I claim is:—

1. In a blast furnace, a protection for the inner lining thereof comprising a series of segregated plates carried thereby and covering a portion thereof.

2. In a blast furnace, a protection for the inner lining and extending over a portion thereof, comprising a series of high carbon steel plates.

3. In a blast furnace, a protection for the inner walls thereof comprising a brick lining, a series of segregated plates on the inner surface and means for securing the same between the layers of bricks forming the lining.

4. In a blast furnace, a protection for the inner walls thereof comprising a brick lining, a concrete backing therefor, a series of plates covering a portion of the inner surface of the lining anchored in the concrete backing.

5. In a blast furnace, a protection for the inner walls thereof comprising a brick lining, a concrete backing therefor and a series of plates covering a portion of the inner surface of the lining and securing the lining against the backing.

6. In a blast furnace, a protection for the inner walls thereof comprising a brick lining, a concrete backing therefor, a series of plates on the inner surface having a projection passing through the lining and anchored in the backing.

7. In a blast furnace, a protection for the inner walls thereof comprising a brick lining, a concrete backing therefor and a series of plates having a flat surface engaging the inner walls of the lining, and a projection passing through the lining into the backing provided at the extremity thereof with a projecting anchor.

8. In a blast furnace, a plate presenting a contact surface having an integral anchoring member.

9. In a blast furnace, a protection upon the interior adapted to receive the impact of the stock from the hopper consisting of segregated contact plates secured about the surface of the inner walls in parallel series, the plates in the adjacent series being arranged in staggered relation to each other.

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Witnesses:

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