

(No Model.)

2 Sheets—Sheet 1.

J. SCOTT.
BOSH PLATE FOR FURNACES.

No. 452,618.

Patented May 19, 1891.

FIG. 3.

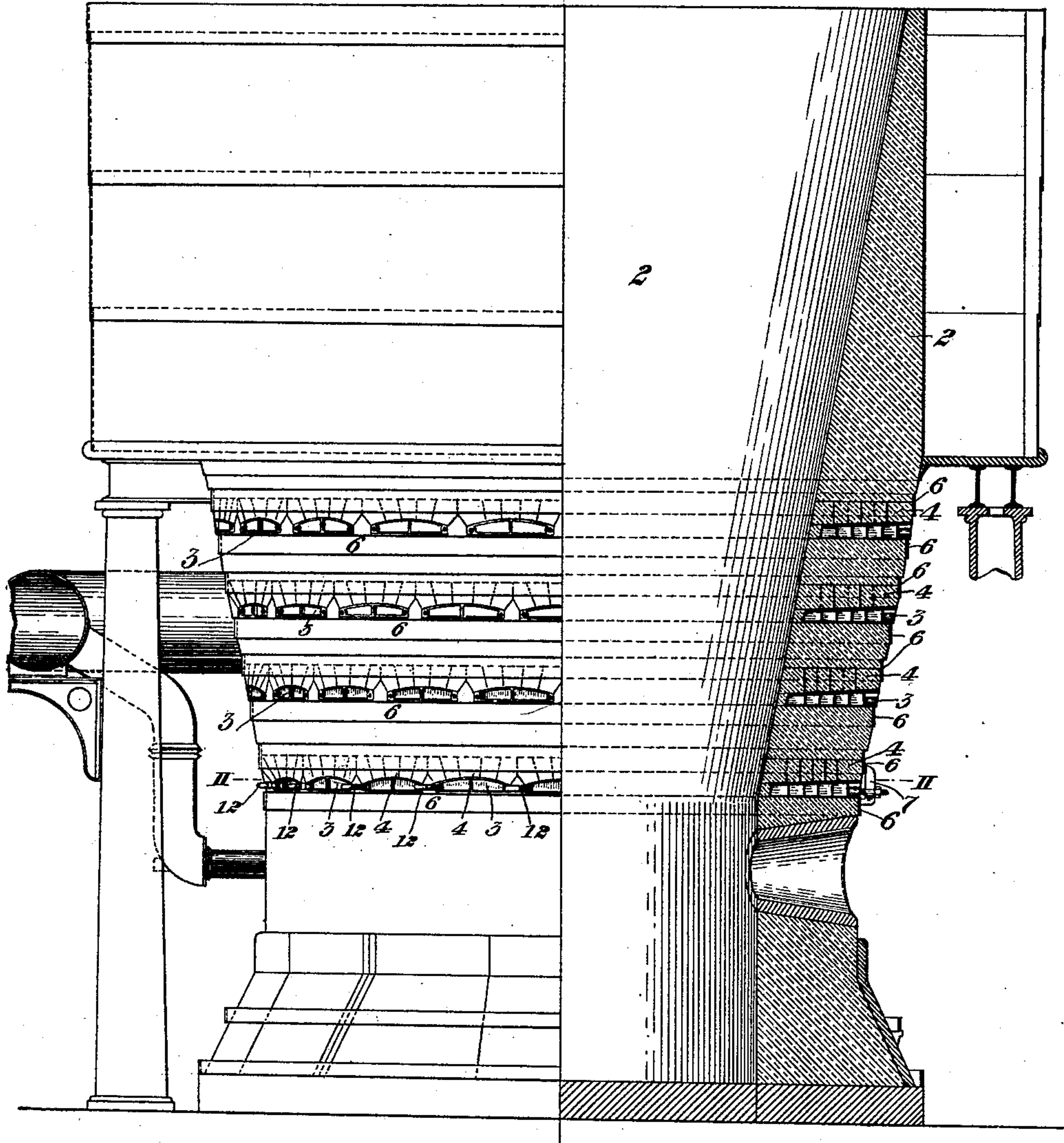
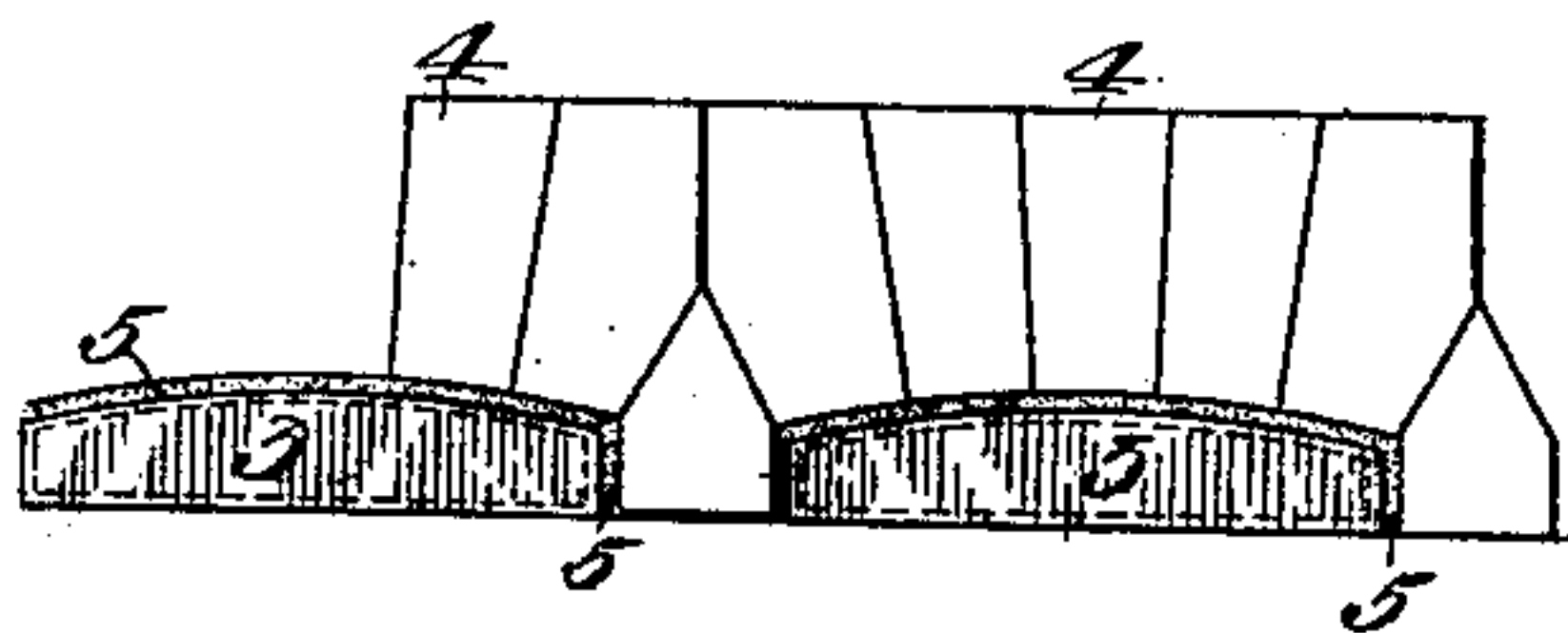


FIG. 4.



WITNESSES

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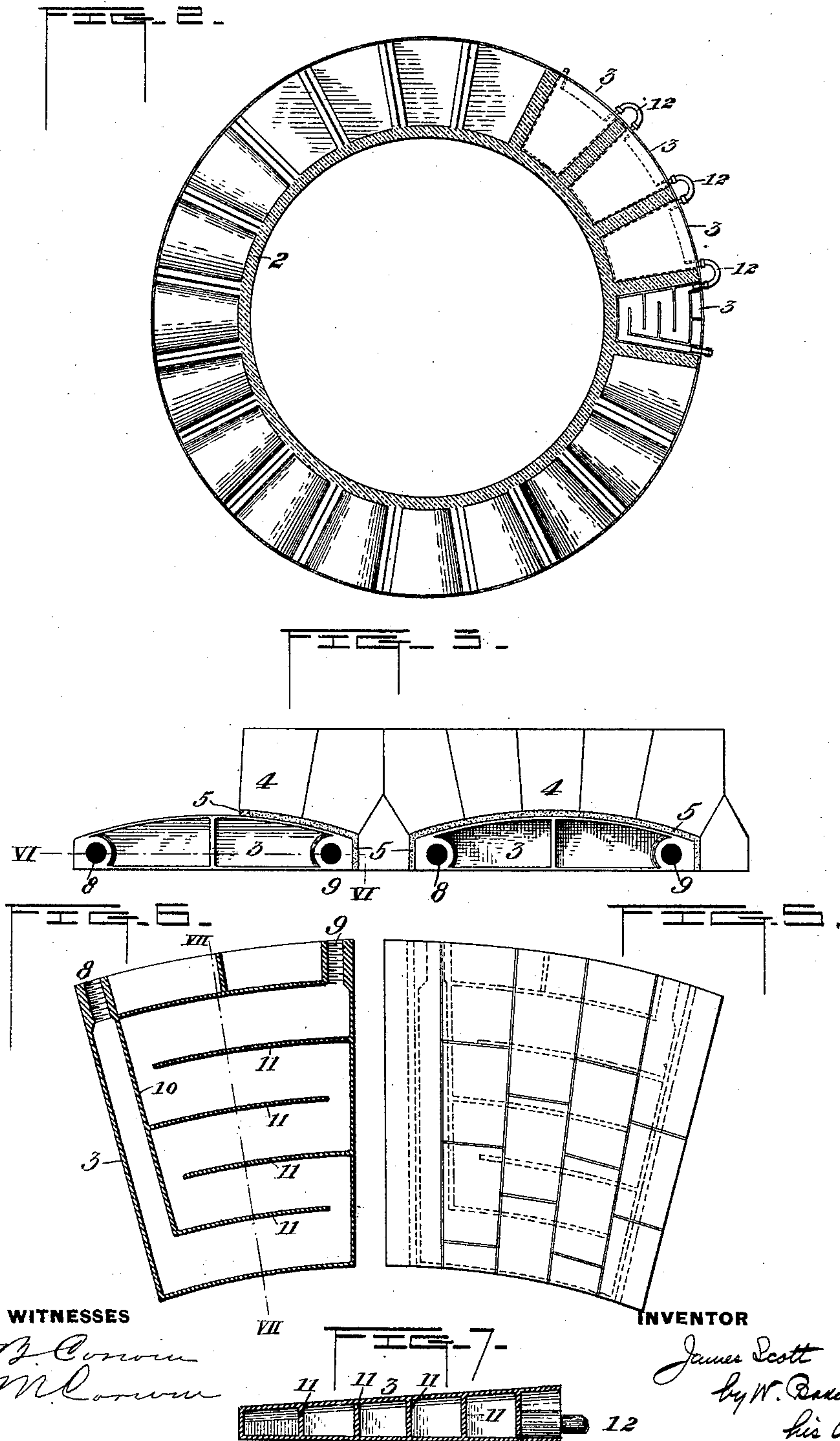
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2 Sheets—Sheet 2.

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No. 452,618.

Patented May 19, 1891.



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES SCOTT, OF PITTSBURG, PENNSYLVANIA.

BOSH-PLATE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 452,618, dated May 19, 1891.

Application filed October 23, 1890. Serial No. 369,032. (No model.)

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 Bosh-Plates for Furnaces, 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, partly in vertical section, showing the bosh of a blast-furnace provided with my improved water-cooled bosh-plates. Fig. 2 is a sectional plan view on the line II II of Fig. 1. Fig. 3 is an elevation of two of the bosh-plates set in position in the blast-furnace wall. Fig. 4 is a similar elevation showing the inner ends of the bosh-plates. Fig. 5 is a plan view of one of the bosh-plate arches. Fig. 6 is a horizontal section of one of the bosh-plates on the line VI VI of Fig. 3, and Fig. 7 is a vertical section on the line VII VII of Fig. 6.

Like symbols of reference indicate like parts in each.

My invention consists in an improvement in the setting of bosh-plates in the wall of a blast-furnace and in an improved construction of the bosh-plates themselves. Heretofore for the purpose of preventing the corrosion and destruction of the walls of a blast-furnace, caused by the intense heat in the furnace, it has been customary to employ hollow plates built in the furnace-wall and provided with water-connections by which streams of water through the plates may be maintained. In the operation of the furnace these plates frequently crack and permit the water to leak from them, the effect of which is not only to deteriorate the masonry of the furnace, but also by introducing water into the furnace-charge to make the furnace irregular in working and irregular in product, and to require the use of more fuel. The broken plate must be removed as soon as the occurrence of the leak is ascertained; but even when a leak is suspected it is frequently difficult to locate it, and often a number of plates must be examined before the leaking one is found. When the leaking plate is found, it requires a great amount of labor to remove it, since it necessitates the digging it

out from the brick-work of the furnace. This weakens and injures the furnace-structure, and because of the time which it requires it is the practice often to shut off the water from a leaking plate and to run for some time without its use. This of course is only done at the expense of the furnace-wall, which rapidly burns out when the water protection is removed. These facts are a constant source of difficulty and annoyance to blast-furnace managers. Heretofore it has been generally supposed that the reason for the breaking of the plates was that they were burned out by the heat of the furnace, and great care has been taken to keep up a constant stream of pure water and to construct the water-passages so that they should not be clogged by sediment, which would render them more liable to be burned. I have discovered, however, that the breaking of the plates has been caused not so frequently by burning as by the manner in which they have been set in the furnace-wall. It has been the practice to build them directly in the wall, with the bricks bearing on them from above and at the side and in the intermediate spaces, so that when the brick-work expands and moves by reason of the heat of the furnace it strains the bosh-plates and frequently breaks or cracks them, even when they themselves have not been injured by the heat. To prevent this is one of the objects of my invention.

Referring now to the drawings, 2 represents the wall of the furnace, and 3 3 are the bosh-plates or coolers, which are arranged, preferably, in several horizontal series around the bosh of the furnace. These plates are preferably made tapering in width and in thickness and curved transversely on their upper surfaces, so as to have a general wedge shape, as shown in Figs. 3, 4, 6, and 7, and they are set in arched recesses built for their reception in the furnace-wall. The general shape of these recesses and the manner in which the arches are formed over them is illustrated in Figs. 1 and 3. The arches 4 are constituted, preferably, by especially-shaped bricks arranged so that the recesses shall conform in shape to the bosh-plates. Their function is to support the furnace-wall over the recesses, so that they shall not cave in when the bosh-

plates are removed, and so that the plates may be taken out and replaced easily without other rebuilding than luting the intervening space with clay, as hereinafter described.

5 Such arched structure is of very material advantage, and is claimed by me specifically herein; but I do not wish to limit thereto the broad claims of this application. The recesses are formed in the furnace-wall during
10 the building of the latter, the number of series of recesses being such as to accommodate the desired number of bosh-plates, and in order to strengthen the structure I prefer to employ bands 6, encircling the furnace at the
15 arches and below the bosh-plates. The bosh-plates should be of somewhat less dimensions than the recesses, and when set therein the surrounding spaces should be luted with clay, as shown at 5. By thus setting the bosh-
20 plates the wall of the furnace may expand and contract freely without crushing the plates and causing them to leak. A number of the plates of each series are connected by pipes 12, the outlet of one being connected
25 with the inlet of the next, as shown in Fig. 2, so that the water may pass in succession through the plates.

When it is desired to remove any of the bosh-plates, its inlet and outlet pipes are un-
30 coupled, and then, because of the tapering shape of the plate, it may be drawn out from its recess. To facilitate such removal I may use a clamp-bar 7, having a bolt extending through it and adapted to be secured to the
35 bosh-plate. By setting the clamp-bar against the furnace, attaching the bolt to the plate, and turning the bolt the plate may be loosened and adapted to be removed with ease. To
40 replace the plate it is set again in its recess, luted with clay, and the water-pipes reconnected. The facility of removal and replacement of the bosh-plates which my improvement affords is of especial benefit, in that it enables a leak to be located in case for any rea-
45 son one should occur.

The preferred internal construction of the bosh-plates is illustrated in Figs. 6 and 7. Each consists of a hollow plate having water inlet and outlet openings 8 and 9, a partition
50 10, forming a passage leading to the rear of the plate from the opening 8, and cross-diaphragms or baffle-plates 11, which cause the water to travel in a circuitous course between the back of the plate and the opening 9. A
55 very efficient cooling action is thus afforded by the plate.

I claim—

1. In combination with a furnace, a water-cooled bosh-plate set in a recess in the furnace-wall, from which it is removable freely,

said bosh-plate having a water-passage extending through it for the passage of a current of water, and inlet and outlet pipes, substantially as and for the purposes described.

2. In combination with a furnace, a water-cooled bosh-plate set in an arched recess in a furnace-wall, from which it is removable freely, said bosh-plate having a water-passage extending through it for the passage of a current of water, and inlet and outlet pipes, substantially as and for the purposes described.

3. In combination with a furnace, a water-cooled inwardly-tapering bosh-plate set in a recess in the furnace-wall, from which it is removable freely, said bosh-plate having a water-passage extending through it for the passage of a current of water, and inlet and outlet pipes, substantially as and for the purposes described.

4. In combination with a furnace, a water-cooled bosh-plate set in a recess in the furnace-wall, from which it is removable freely, and provided with a surrounding casing or layer of clay, said bosh-plate having a water-passage extending through it for the passage of a current of water, and inlet and outlet pipes, substantially as and for the purposes described.

5. In combination with a furnace, a series of encircling water-cooled bosh-plates set in recesses in the furnace-wall, from which they are freely removable, said bosh-plates having water-passages extending through them for the passage of water-currents, and inlet and outlet pipes, substantially as and for the purposes described.

6. In combination with a furnace, a series of encircling water-cooled bosh-plates set in arched recesses in the furnace-wall, from which they are freely removable, and a band encircling the furnace at the arches, substantially as and for the purposes described.

7. A hollow bosh-plate having at the front end an inlet-opening and an outlet-opening, a passage 10, which extends to the rear of the plate from one of said openings, and cross-diaphragms 11, which extend alternately from opposite sides within the bosh-plate partially across the interior cavity thereof, forming a tortuous passage in said cavity leading from the passage 10 to the second of said openings, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 14th day of October, A. D. 1890.

JAMES SCOTT.

Witnesses:

THOMAS W. BAKEWELL,
W. B. CORWIN.