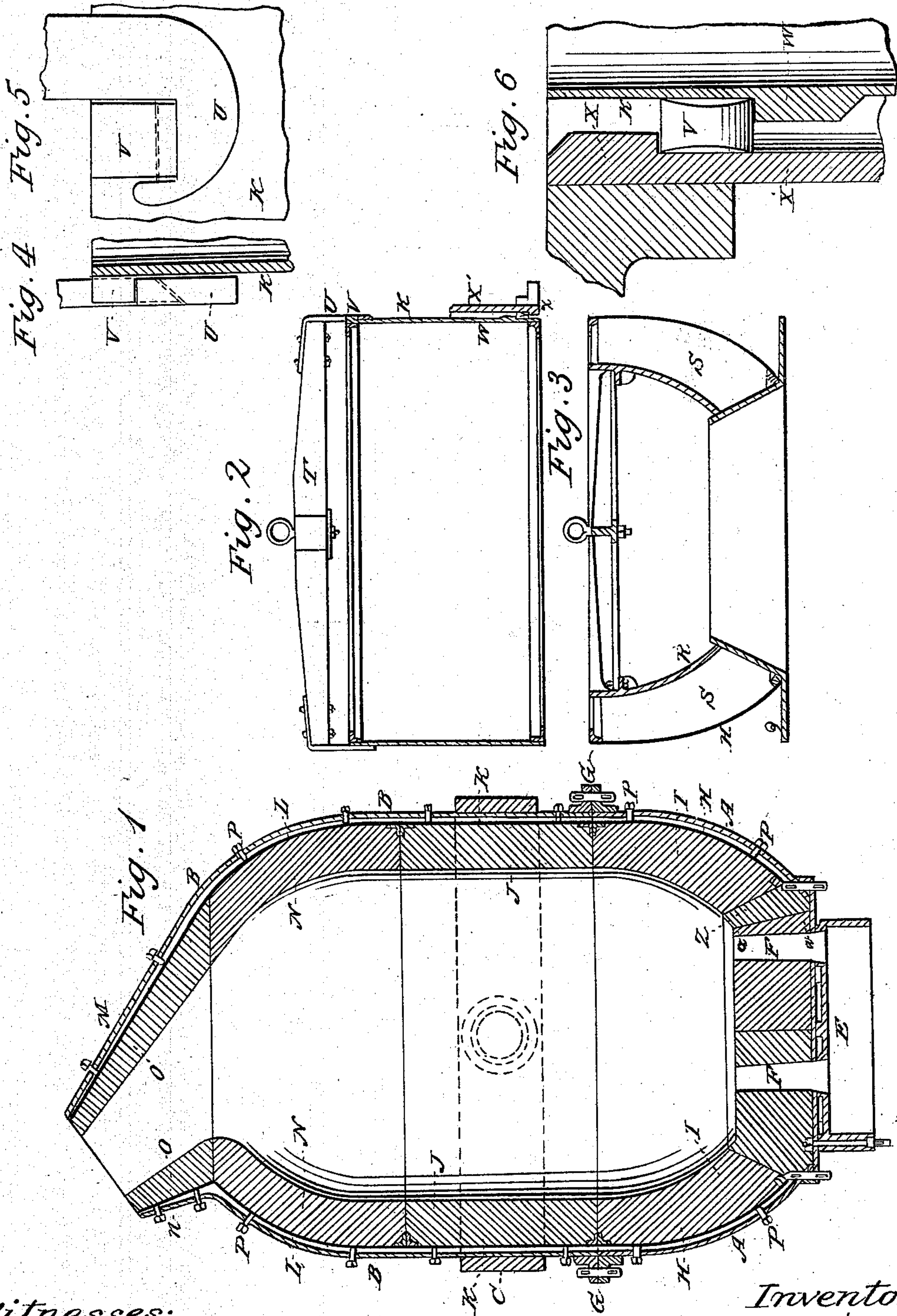


A. L. HOLLEY.
Making Bessemer Steel.

No. 104,592.

Patented June 21, 1870.



Witnesses:
J. B. Beecher
H. L. Hodge

Inventor:
A. L. Holley

United States Patent Office.

ALEXANDER L. HOLLEY, OF BROOKLYN, NEW YORK.

Letters Patent No. 104,592, dated June 21, 1870.

IMPROVEMENT IN LINING BESSEMER CONVERTERS.

The Schedule referred to in these Letters Patent and making part of the same.

To whom it may concern:

Be it known that I, ALEXANDER L. HOLLEY, of the city of Brooklyn, county of Kings and State of New York, have invented a new and useful Improvement in Lining Bessemer Converters; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

Bessemer converters are usually lined by taking the converter apart at a joint near the trunnions, so that suitable molds can be inserted. Into the annular spaces, (generally eight to ten inches wide,) between these molds and the interior of the skin of the converter, pulverized refractory lining material (generally silicious stone and a little clay) is rammed.

The two parts of the converter are then put together again, and the lining then being glazed by heat, is ready for use. The lining of the nose of the converter is usually made of fire-bricks.

The time occupied in lining a five-ton converter by the ordinary method is from twenty-four to forty-eight hours, during which time the converter is, of course, out of use, and the product of the works is proportionally diminished, and, as linings do not usually stand more than two hundred heats, the loss due to lining is considerable.

My improvement consists chiefly in ramming the lining material into several iron shells previously fitted to the interior of the converter, and then setting these shells into the converter, so as to form a continuous lining. I provide duplicate shells, so that, while one set is in use another set is being rammed and dried. The converter is thus out of use only while the shells are being set into it and glazed.

To enable others to construct and use my invention, I will now more particularly describe it with reference to the annexed drawings, in which the same letters refer to like parts.

Figure 1 is a vertical section of a converter, of which A and B are respectively the lower and upper portions of the skin.

C is the trunnion-ring;

D, a trunnion;

E, the twee-box; and

F F are tweers.

In lining a converter thus constructed, by the ordinary method, the section A below the joint G would be removed, and the section B would be turned on the trunnions nose downward, so that both sections would be accessible from the top for the insertion of the molds and of the lining material.

I take the converter apart in the same or in any

suitable place and manner, but instead of ramming the lining directly against the skin, I set previously rammed shells into the converter.

These shells are shown at H K L M as set in the converter, and containing their linings I J N O.

In order that the shells may be firmly held in place, they may be accurately fitted to the interior or to projections upon the interior of the converter skin. I prefer, however, to adjust the shells, and to hold them firmly in place, by means of the set-screws P P, screwed through the skin of the converter at various places.

The size and position of the set-screws will depend on the thickness and size of the shells. In a five-ton converter having shells three-eighths of an inch thick, two horizontal rows of set-screws, one and a quarter inch diameter and from two to three feet apart for each shell, will be sufficient.

The shells are rammed with the usual refractory lining material in the following manner:

The shell H, Figure 3, is set over the mold Q, the mold R is inserted into the shell, and the annular space S is filled and rammed just as the skin of the converter would be filled and rammed by the usual method of lining.

The mold R is then removed, and the lining in the shell H is dried by means of an oven, or in any suitable manner, when it is ready to be set into the converter. The other shells are lined by the aid of suitable molds, in the same manner.

The shell M, fig. 1, may be lined with fire-brick just as the nose of the converter is usually lined.

In order to have a set of lined shells ready to put into a converter when the set already in use shall require removal, I provide at least three sets of shells for a pair of converters, so that one set may be always lined, or in process of lining, while the other two sets are in use.

These shells may be removed from or set into the converter by any suitable means. I prefer to use the cross-beams T, Figure 2, provided with hooks U, which may be swung under and caught upon the lugs V, which are fastened to the exterior of the shell.

This arrangement occupies very little space between the shell and the skin of the converter, and it lifts the shell and its lining evenly at four points. It is shown on a larger scale at Figures 4 and 5.

To remove a worn lining, I take the converter apart at the joint G G, as usual. I then remove the lower section of the converter, and turn the upper section nose down. I then slack all the set-screws P P, when each section, with its lining, may be lifted out by the cross-beams T T by means of a crane.

Care should be taken in this case to break the glazed surface of the lining with a bar, so that it may be easily fractured at the intersections of the shells.

I prefer, however, in case the lining is very hard, to soften and crack it by throwing water on it while it is red hot, and then to remove it by wedges or bars, or in any suitable manner, before taking out the shells.

The newly-lined shells are then set into their proper places in the converter, in order. As each one is set it is adjusted and fastened by turning up the set-screws.

A little of fire-clay, or suitable refractory material, should be placed upon the top of the lining of each shell before the next shell is set upon it.

After the converter is put together again the joints between the linings of the different shells should be inspected from within, and, if they are at all open, they should be closed with plastic or semi-fluid refractory material in the ordinary manner. The converter is then glazed, as usual, when it is ready for use.

In order to prevent the shells K L from slipping down when the upper section of the converter is turned nose up, and before the bottom section is attached, I prefer, rather than to trust to the set-screws alone, to add two or more positive fastenings, such as the wedge Y, figs. 2 and 6, inserted between a lug, W, on the shell K, and a lug, X, on the skin X' of the converter.

When using duplicate removable converter-bottoms *a a*, I prefer to mold the lining I, in the lower shell, of

such form as to leave an annular space around the said bottom, this space to be filled by ramming it with the ring of refractory material Z. But the lower part of the lining I may be molded to suit any other method of setting bottoms.

In order to hold the shells more firmly in their places, the annular spaces between the shells and the skin of the converter may, in some cases, be filled with sand or with any suitable compact material.

I generally prefer, however, to leave this annular space unfilled, and to make numerous holes in the skin of the converter through which the shells may be observed, so as to judge of the state of the lining. When the lining is very thin the shell will become red hot.

In constructing new converters, I sometimes prefer to make the converter a skeleton or frame-work without a continuous skin. The shells then constitute the skin of the converter.

What I claim, and desire to secure by Letters Patent, is—

The combination with a Bessemer converter of a sectional lining in removable shells, substantially as and for the purposes set forth.

A. L. HOLLEY. [L. S.]

Witnesses:

BARNEY MEE,

P. HARRY MITCHELL.