No. 796,169. PATENTED AUG. 1, 1905.

C. M. ALLEN.

METHOD OF LINING CONVERTERS.

APPLICATION FILED MAR. 31, 1904. RENEWED JAN. 10, 1905.

2 SHEETS—SHEET 1.

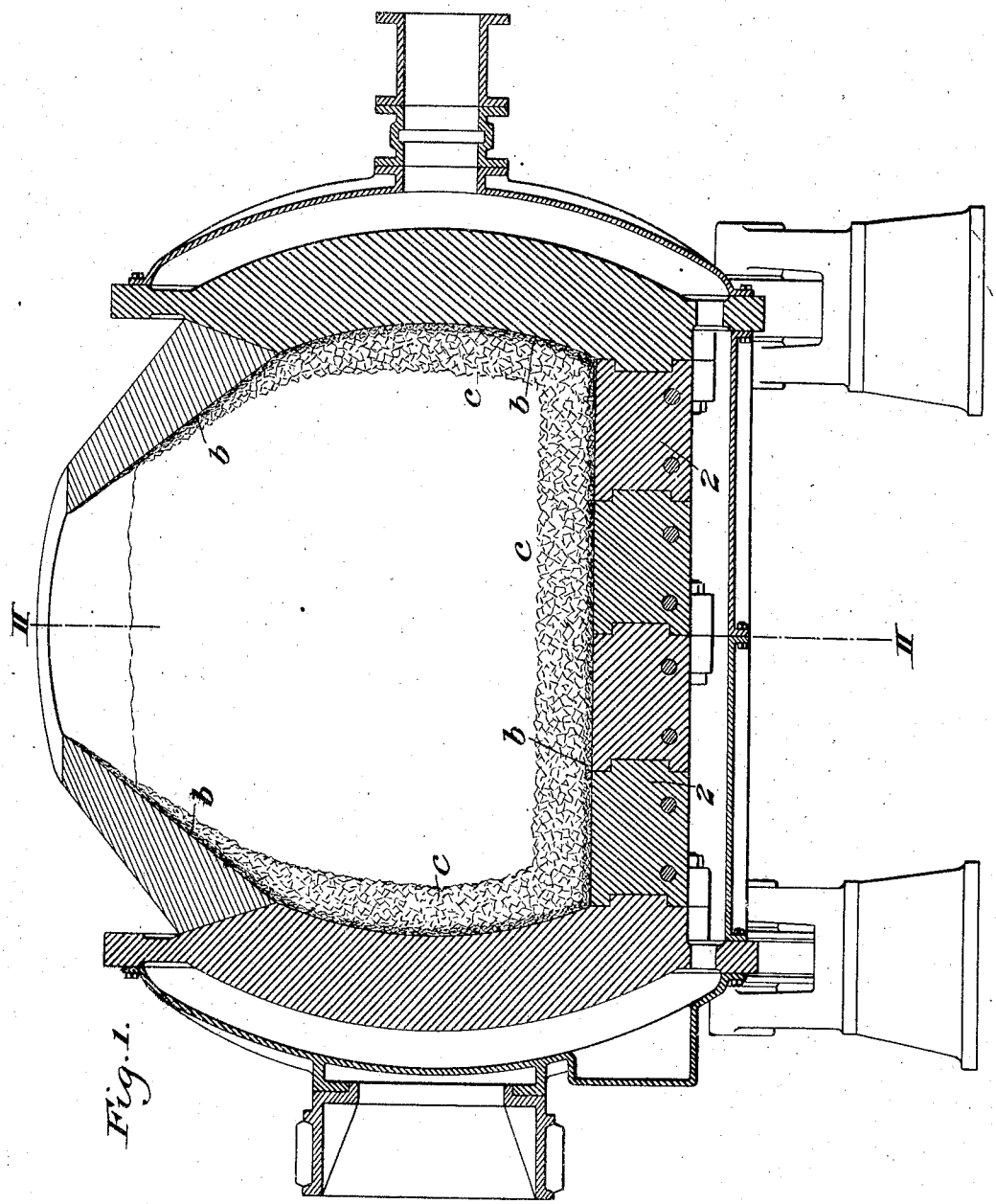


Fig. 1.

WITNESSES

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Thomas W. Bakewell

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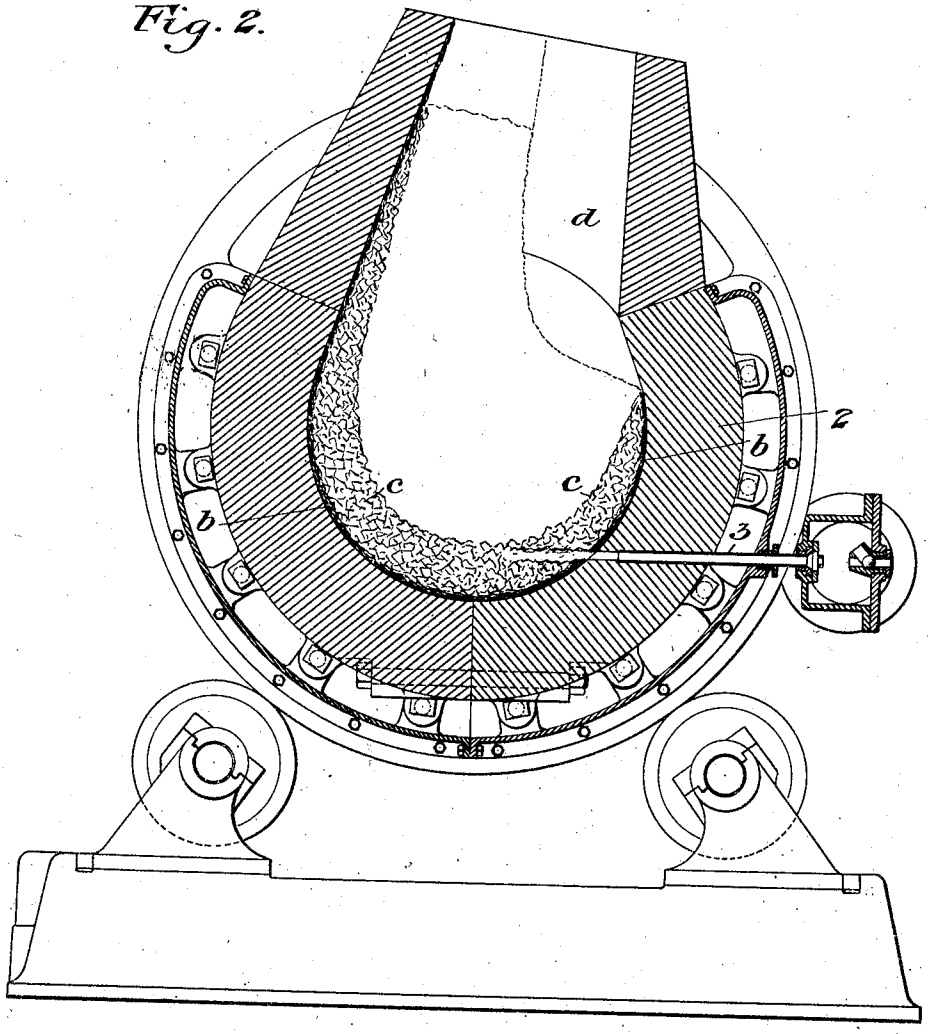
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2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

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METHOD OF LINING CONVERTERS.

No. 796,169. Specification of Letters Patent. Patented Aug. 1, 1905.

Application filed March 31, 1904. Renewed January 10, 1905. Serial No. 240,509.

To all whom it may concern:

Be it known that I, CHARLES M. ALLEN, of Lolo, in the county of Missoula and State of Montana, have invented a new and useful Method of Lining Converters, 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 shows a longitudinal central section of a converter which has been lined in accordance with my invention, and Fig. 2 is a vertical cross-section on the line II II of Fig. 1.

Converters used for bessemerizing copper have been lined with a silica lining which is designed to supply silica to act as a fluxing material for the iron of the matte, and as the lining is thus destroyed by the reactions which take place during the process it must be renewed every few blows at a cost of about forty dollars for each relining. This necessitates the employment of a special crew of men and the use of a large number of spare converter-shells to make it possible to carry on continuous operations.

I have discovered a method by which linings can be applied without delay and almost without cost and without the need of the large number of extra shells heretofore employed. Indeed, it becomes a source of profit when practiced in such manner as to utilize the principles of the invention broadly claimed by Ralph Baggaley in his Patent No. 746,260, as explained below.

In practicing my invention I distribute on the interior of the converter a coating or layer of slag or matte in a liquid condition, then apply the lining material to the coated interior and cause it to adhere thereto, after which it may, if desired, be cemented with another addition of slag or matte. The advantage of this method is that it enables me to apply a lining quickly and without cost, and the lining being relatively loose and open is in condition to combine readily with the iron of the converter-matte and to render the blow of short duration. This of course involves a more rapid destruction of the lining; but in my process this does not detract from the advantages which I derive, for the reason that the lining is so quickly and cheaply applied. Heretofore the silica lining has been applied in admixture with plastic clay, and the expense of applying it has led to a practice of packing it firmly against the converter-wall. This renders the lining more durable; but it also impairs its capacity for combining with the iron of the matte, which is the necessary function of the lining, and when it is packed too hard it is often necessary to discontinue the use of the converter and reline it.

I believe I am the first to apply an adhering open and unpacked lining to a converter and desire to claim it broadly.

The drawings, which illustrate the practice of my invention, show a tipping copper-converter having a metal shell 2, to which it is desired to apply a silicious lining. To do this, the converter being heated, as it is after the charge is poured therefrom, I run into it from a smelting-furnace, forehearth, or other convenient source a body of molten slag, preferably enough to equal in volume one-half the usual converter charge, or I may use for the same purpose some molten matte. I then tip the converter back and forth on its axis, so as to distribute the slag or matte over the interior surface in a sticky layer, as indicated at *b*, and then I tip the converter completely to discharge the surplus. I then feed to the furnace a body of loose silicious material, preferably silicious copper ore, and by rocking the converter back and forth it is tumbled over the layer *b* and adheres thereto in a layer *c*, or I may spread the ore over the converter with a shovel or otherwise. A small quantity of molten matte or slag is then preferably poured into the converter and being distributed in like manner over the lining completes the bonding of its particles. The slag or matte quickly sets, and, if desired, the setting can be hastened by blowing air thereon from the twyers 3. The silicious material is thus held to the converter with sufficient firmness to serve the purpose of a lining and to supply silica flux to the charge beneath the bath opposite the twyers, where it is most efficient; but being open and unpacked it acts more readily and causes the converting operation to proceed more quickly than is possible with linings heretofore employed. In converters as ordinarily constructed the entire surface, except a portion *d*, Fig. 2, can be lined in this manner.

Instead of first distributing a layer of molten matte or slag over the converter before applying the silicious lining I may place the silicious material in the converter in quantity as de-

sired and may cause it to adhere by pouring on it a small volume of molten slag or matte and allowing it to set sufficiently to be retained in place.

The advantages of employing silicious ore as the material for the lining is that the values of the ore are taken up by the converter-bath.

Within the scope of my invention as herein claimed the operation may be modified, since

What I claim is—

1. The method of lining converters which consists in applying silicious material to the interior of a converter by adhesion with molten viscous slag or matte; substantially as described.

2. The method of lining converters which consists in distributing silicious material on the interior of the converter while its surface is covered with molten viscous slag or matte; substantially as described.

3. The method of lining converters which consists in distributing silicious material on the interior of the converter while its surface is covered with molten viscous slag or matte and then applying molten slag or matte as a cementing agent and permitting the same to set; substantially as described.

4. The method of lining converters which consists in applying silicious material to the interior of a converter by adhesion with molten viscous slag or matte and cooling the slag or matte by an air-blast; substantially as described.

In testimony whereof I have hereunto set my hand.

CHARLES M. ALLEN.

Witnesses:

MALCOLM L. MACDONALD,

THOMAS W. BAKEWELL.