

W. H. PEIRCE.
METALLURGICAL CONVERTER.
APPLICATION FILED OCT. 22, 1909.

942,661.

Patented Dec. 7, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

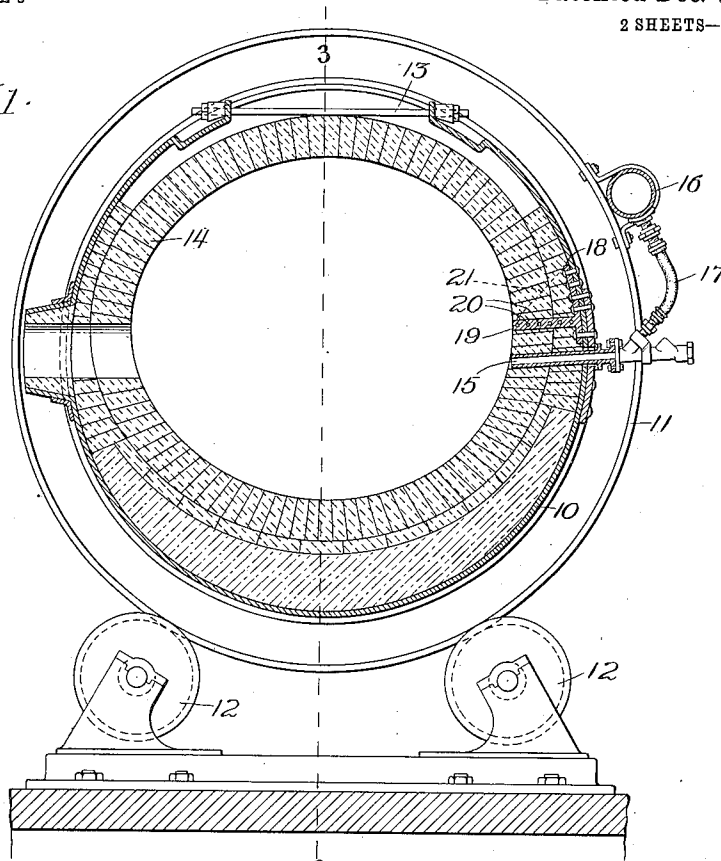
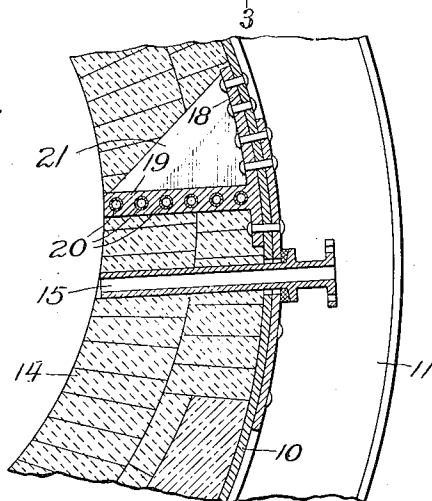


Fig. 2.



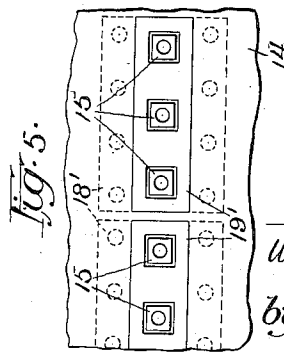
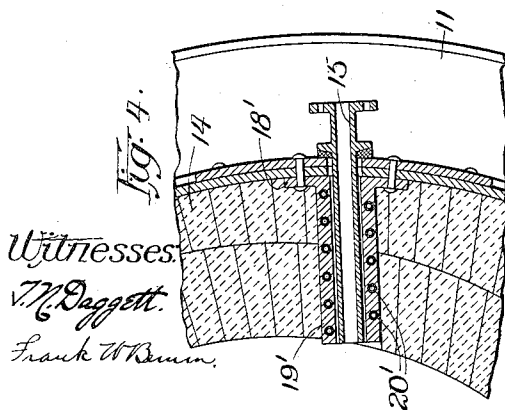
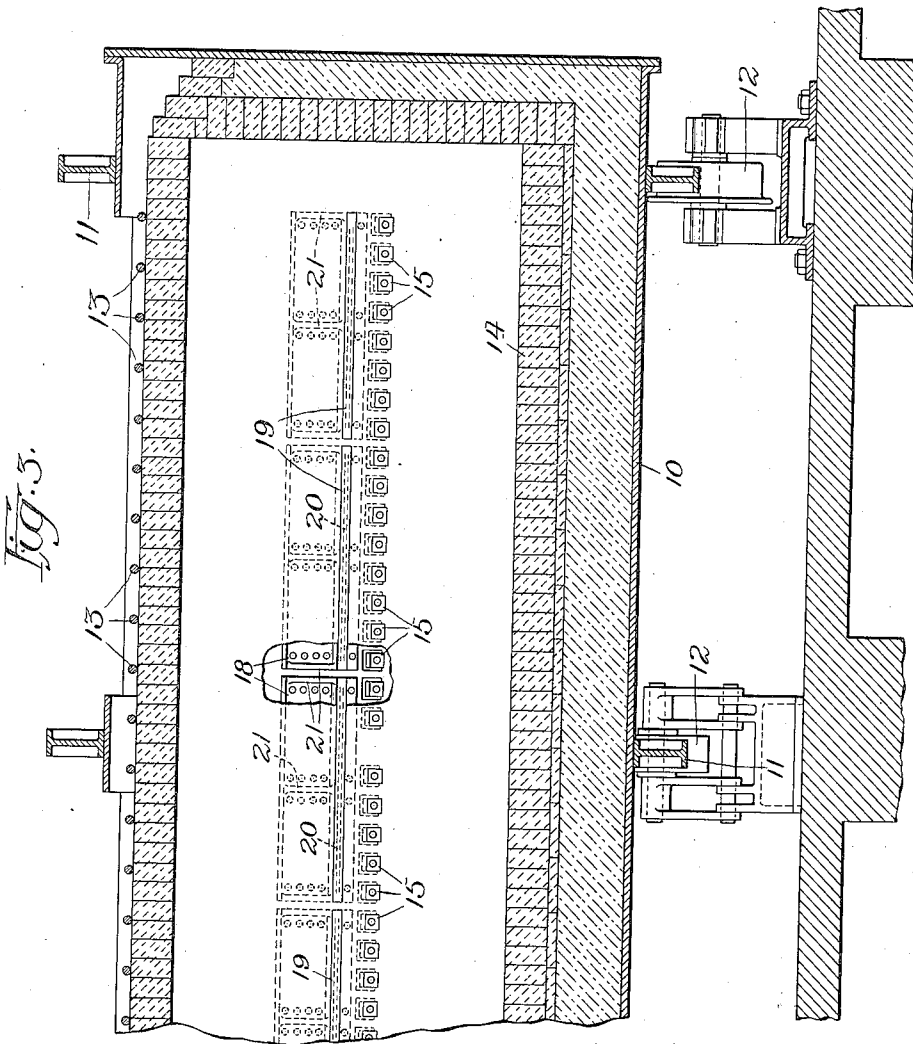
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UNITED STATES PATENT OFFICE.

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METALLURGICAL CONVERTER.

942,661.

Specification of Letters Patent.

Patented Dec. 7, 1909.

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To all whom it may concern:

Be it known that I, WILLIAM H. PEIRCE, a citizen of the United States, and a resident of the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Metallurgic Converters, of which the following is a specification.

The invention relates to metallurgic converters and more particularly to converters 10 for bessemerizing copper matte. In customary practice, such converters are provided with a silica lining which unites with the iron present to form a slag, and which lining must be frequently renewed. Many 15 attempts to employ a magnesite, chrome oxid or other non-corrodible lining have failed from one cause or another, usually because of the disintegration of the lining. The defects in the conversion of copper 20 matte in a basic lined vessel were remedied by the invention set forth in an application for Letters Patent filed in the United States Patent Office jointly by Elias A. C. Smith and myself, on July 13, 1908, Serial No. 25 438,286. In accordance with that invention, the non-corrodible converter lining is free to shift relatively to the shell, so that the lining can expand under the high heat developed in the course of treatment and at the 30 same time preserve its continuity, and the twyers, embedded in the lining, have full delivery connection with the blast supply. In the preferred embodiment of the invention set forth in said application, the twyers are 35 flexibly sustained to shift with the lining to thereby avoid the breaking down of the twyers or the lining. Leaks through the lining, which would tend to disintegrate it, were thereby avoided. In accordance with 40 the present invention, the lining is shiftable as before relatively to the shell but the section of the lining in the immediate neighborhood of the twyers is anchored to the shell to form a zone in which there is no substantial shift. 45

In the preferred form, the converter comprises a cylindrical shell or body rotatably sustained in horizontal position for axial turn, as may be requisite to insure proper 50 delivery of the molten matte and ready discharge of the accumulated slags, white metal or blister copper in course of treatment. The cylindrical shell is preferably open at its upper side to permit expansion of the 55 lining and is provided, as set forth in the

prior application, with a tenacious, coherent, non-corrodible lining arched over at the open top of the shell and free to expand therein, and the set of blast twyers, extending through the lining, are arranged longitudinally at one side of the shell. In such a converter, the expansion of the lining is chiefly in a vertical direction or transverse to the axis of the shell. To substantially prevent this shift in the immediate neighborhood of the twyers, the section of the lining at one side of the converter and at the longitudinally extending twyer belt, is anchored to the shell, the lining being otherwise free to expand in opposite direction 60 from the twyer belt. 65

In accordance with the preferred plan, the twyers are embedded in the lining and an abutment or a series of abutments of metal, secured to the shell and extending into the lining, form a longitudinally extending shelf or barrier adjacent the set of twyers. 75

In the drawings, which illustrate the preferred form of the invention, Figure 1 is a cross section of the converter; Fig. 2 is an enlarged detail view; and Fig. 3 is a partial longitudinal section on the line 3—3 of Fig. 1. Figs. 4 and 5 are detail views of a modification. 80

The converter has the usual cylindrical 85 metal body or shell 10 equipped with ring flanges 11, that rest upon rollers 12 to support the vessel and allow for its axial turn at such times as may be necessary during treatment. The shell is open at its upper 90 side and the opposite sides of the opening are connected by a series of tie-rods 13. The shell is provided with a continuous, non-corrodible, basic lining 14, arched over at the top and is preferably formed, at its 95 more exposed portions, of magnesite brick luted with a cement composition of ground magnesite and linseed or molder's core oil. The twyers 15 are arranged in a longitudinal series at one side of the shell and are 100 suitably connected to the blast supply. In the form shown, a bustle pipe 16 is mounted on the flanges 11 of the converter and is connected to the separate twyers by a series of coupling pipes 17. The twyers are preferably formed of hollow metal castings, 105 square in cross section to fit the lining brick through which they extend.

To prevent the distortion or breaking of the twyers by the shift of the lining, the 110

section of the lining at the twyer belt is anchored to the shell, preferably by means of a metal abutment secured to the shell and extending into the lining adjacent the twyers. In the preferred form, the abutment comprises a series of cast metal brackets, each comprising a base portion 18 securely bolted or riveted to the inner surface of the shell, and a projecting portion 19 which extends into the lining to a greater or less extent adjacent the twyers. The projecting portions 19 of the brackets form a longitudinally extending abutment or shelf which is preferably arranged above and spaced apart from the twyers as shown, and which forms a barrier against substantial transverse shift of the lining in the immediate neighborhood of the twyers, so that the latter cannot be bent or broken by the movement of the lining. The lining is otherwise free to expand under the influence of the high heat of the blow and shift in opposite direction from the twyer belt and thus preserve its continuity. If this heaving and expansion is materially interfered with, it would tend to disintegrate the lining and, for this reason, the shift of the lining is facilitated, except at the twyer belt, by taking care that there shall be no material obstruction or projection on the inner surface of the shell by reason of joints, rivets and the like.

The brackets may be formed of iron, steel, bronze, copper or other metal and are preferably water-cooled by suitable means. In the form shown, the inwardly projecting portion or shelf 19 of each bracket is provided with water pipes 20 extending longitudinally therethrough. If water-cooled, the brackets are preferably spaced far enough above the twyers to prevent the submersion of the brackets when the furnace is turned to submerge the twyers. Then, if a water-cooled bracket should leak, the danger of an explosion due to the generation of steam below the surface of the bath, is avoided. In the form shown, each bracket is provided with strengthening ribs 21 that extend between the upper side of the shelf 19 and the base portion 18, and which are spaced in accordance with the size of lining brick employed.

In the form shown in Figs. 4 and 5, the inwardly projecting portions 19' of the brackets surround the twyers. In such case, there may be a bracket for each twyer, or one for each two, three or more adjacent twyers. In the form shown, each bracket is provided with openings for three twyers. These brackets are provided with base flanges 18' stoutly bolted or riveted to the shell 10, about the openings through which the twyers extend and the inwardly projections 19' are provided with cooling coils 21'.

It is obvious that the details of construc-

tion set forth may be varied without departure from the essentials of the invention. In both forms illustrated, a zone is formed in the lining through which the twyers extend and in which there is no substantial shift, to thereby guard against the distortion or breaking of the twyers and the escape of air therefrom such as would tend to break down the lining. If the twyers should leak, the barrier or shelf in the form shown in Figs. 1 to 3 inclusive would prevent the passage of air up through the lining, and the brackets shown in Figs. 4 and 5 form supplemental twyers and guard the lining against such leaks. The joints of the magnesite brick with one another and with the twyers and abutments are luted with the cement composition of ground magnesite and a suitable oil and a tight, non-corrodible lining is thereby formed which can expand within the shell and, as it is of arched form will, at the same time, sustain itself and preserve its continuity.

I claim as my invention:—

1. In metallurgic converters, the combination with an outer shell, of an inner lining shiftable relatively to the shell under the influence of heat, a set of twyers extending through the lining, and an abutment secured to the shell adjacent the twyers and embedded in the lining to form a substantially non-shifting zone therein in the immediate neighborhood of the twyers, the lining being free to expand in opposite directions from such zone, substantially as described.

2. In metallurgic converters, the combination with a cylindrical shell rotatably sustained in horizontal position, of an inner, continuous lining shiftable relatively to the shell under the influence of heat, a set of twyers arranged longitudinally at one side of the shell and extending through the lining, and a longitudinally extending shelf secured to the shell adjacent the twyers and extending into the lining to form a substantially non-shifting zone therein at the twyer belt, the lining being otherwise free to expand in opposite directions from the twyer belt, substantially as described.

3. In copper matte converters, the combination with an outer shell, of an inner lining expansible therein under the influence of heat, a set of blast twyers extending through the lining, and an abutment adjacent the twyers, said abutment forming a barrier against substantial transverse shifting of the lining in the immediate neighborhood of the twyers, substantially as described.

4. A converter for bessemerizing copper matte comprising an outer shell having a tenacious, coherent non-corrodible lining shiftable relatively to the shell under the influence of heat, a set of blast twyers extending through the lining, and means form-

ing a non-shifting zone in the lining in the immediate neighborhood of the twyers, substantially as described.

5. A converter for bessemerizing copper matte comprising an outer shell, a set of blast twyers extending through said shell, and a tenacious coherent lining of non-corrodible basic material continuous with the shell and having a substantially non-shifting zone formed therein in the immediate neighborhood of said twyers, said lining being otherwise free to expand within the shell under the influence of high heat while preserving its continuity, substantially as described.

6. A copper matte converter comprising a cylindrical shell rotatably sustained in horizontal position, a set of blast twyers arranged longitudinally at one side of said shell, and an inner, continuous lining of non-corrodible, basic material having a substantially non-shifting zone formed therein at the twyer belt, said lining being otherwise free to expand under high heat in opposite directions from the twyer belt while preserving its continuity, substantially as described.

7. A copper matte converter comprising an outer shell, an inner, non-corrodible lining shiftable relatively to the shell under the influence of heat, a set of blast twyers embedded in the lining, and an abutment secured to the shell and embedded in the lining on one side of and adjacent said twyers but spaced apart therefrom, said abutment forming a barrier for preventing the substantial shift of the section of the lining in the immediate neighborhood of the twyers, substantially as described.

8. A copper matte converter comprising an outer shell, an inner, non-corrodible lining therefor shiftable relatively to the shell under the influence of heat, a set of metal twyers extending through the lining, and a water-cooled, metal abutment secured to the

shell adjacent the twyers and extending into the lining to prevent the substantial shift of the section thereof in the neighborhood of the twyers, substantially as described.

9. A copper matte converter comprising a cylindrical shell rotatably sustained in horizontal position and having a continuous, non-corrodible lining shiftable relatively thereto under the influence of heat, a set of twyers arranged longitudinally at one side of the converter shell and extending through the lining, and a metal shelf secured to the shell adjacent the twyers and extending into the lining to prevent the substantial shift of the section of the lining through which the twyers extend, substantially as described.

10. A copper matte converter comprising a cylindrical shell rotatably sustained in horizontal position and having a continuous, non-corrodible lining shiftable relatively thereto under the influence of heat, a set of twyers arranged longitudinally at one side of the converter shell and extending through the lining, and a water-cooled, metal shelf secured to the shell and embedded in the lining adjacent and above the twyers, substantially as described.

11. A copper matte converter comprising a cylindrical shell rotatably sustained in horizontal position and open at its upper side, an inner, continuous, non-corrodible lining arched over at the top and shiftable relatively to the shell under the influence of heat, a set of blast twyers arranged at one side of the shell and extending through the lining, and an abutment secured to the shell and extending into the lining adjacent the twyers to form a barrier against the substantial transverse shift of the lining in the immediate neighborhood of the twyers, substantially as described.

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