W. H. PEIRCE.

METALLURGIC CONVERTER.

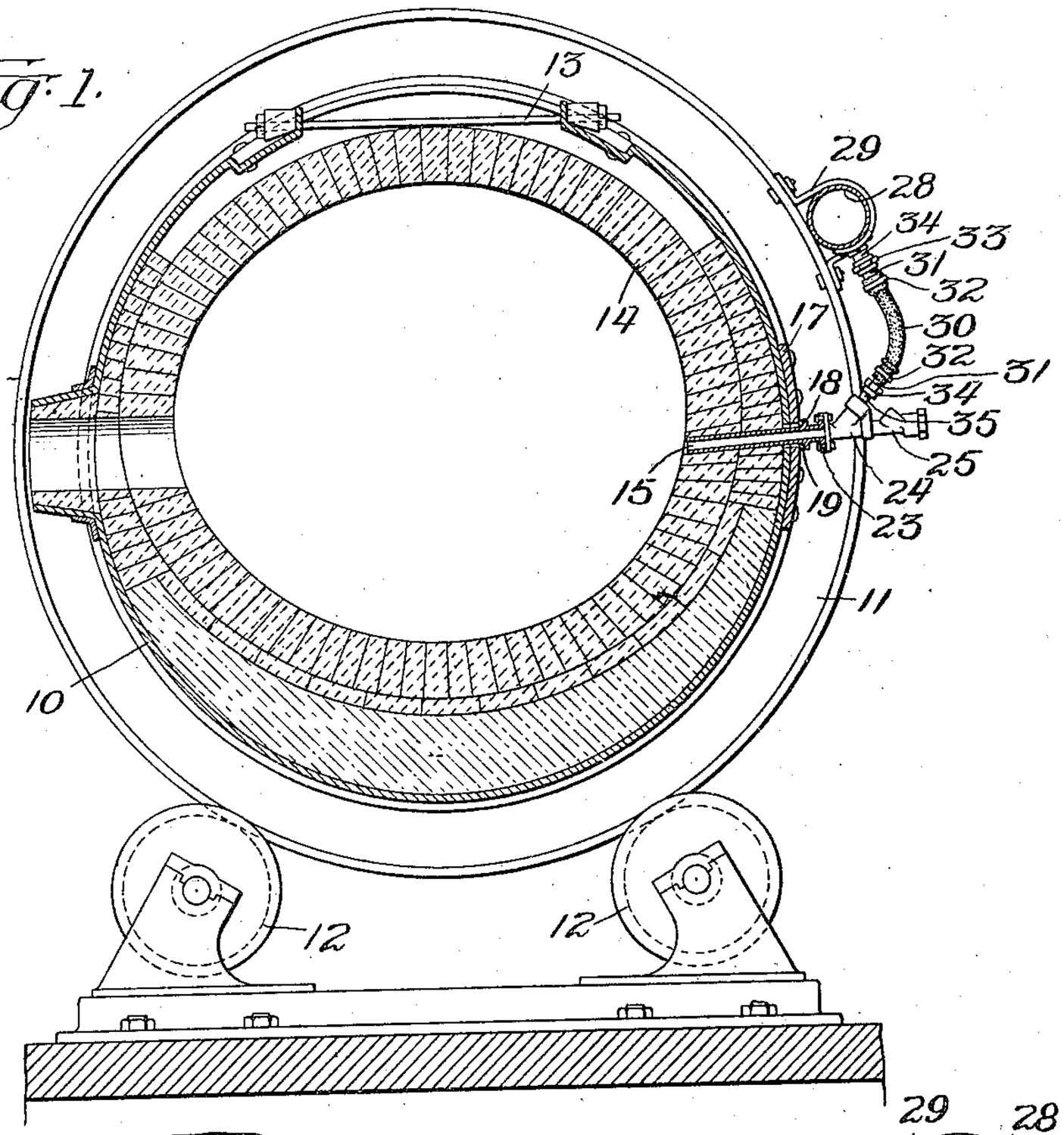
APPLICATION FILED OCT. 15, 1909.

942,973.

Patented Dec. 14, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



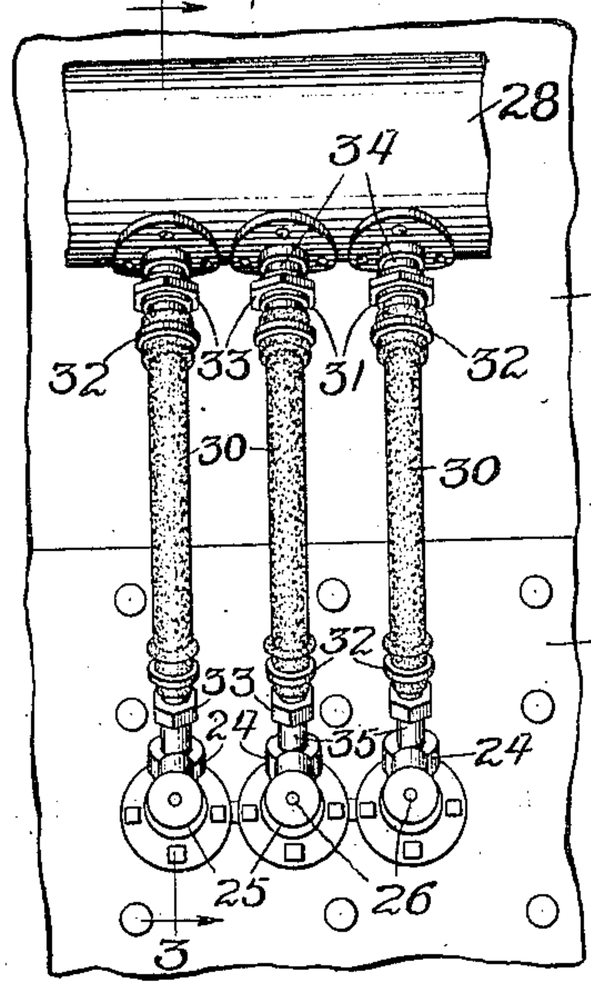
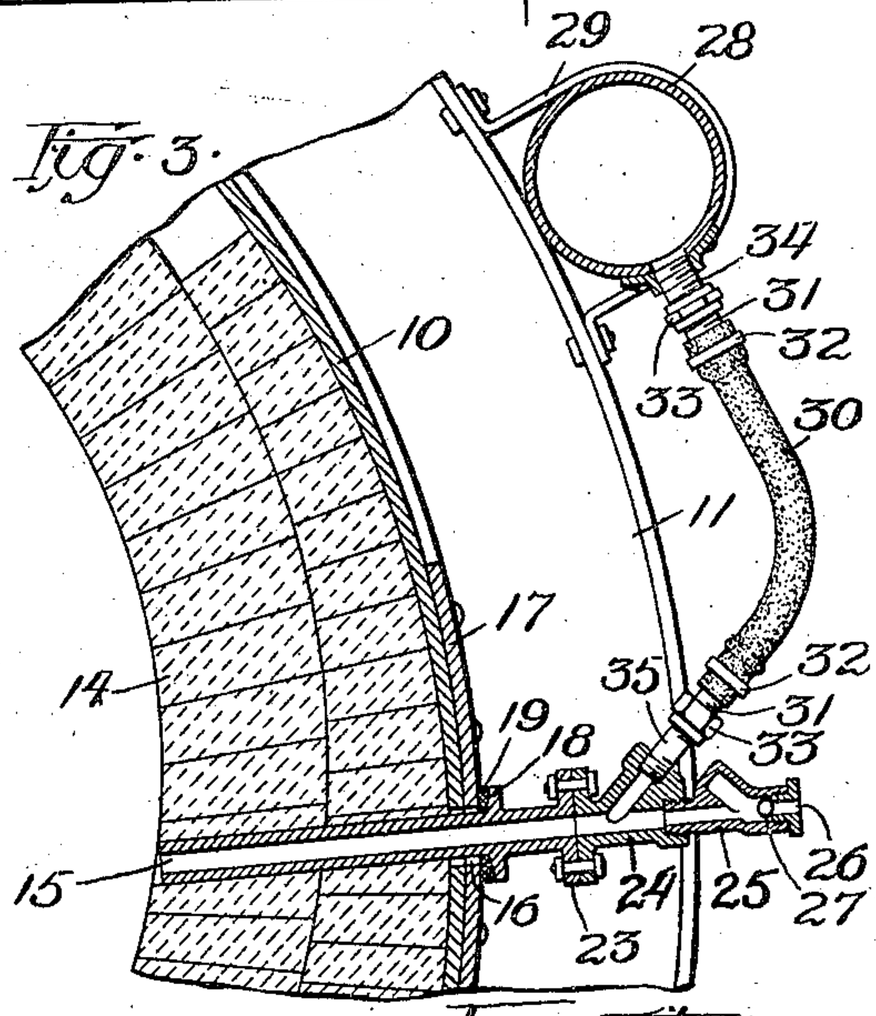


Fig. 2.

Fig. 3.



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2 SHEETS—SHEET 2.

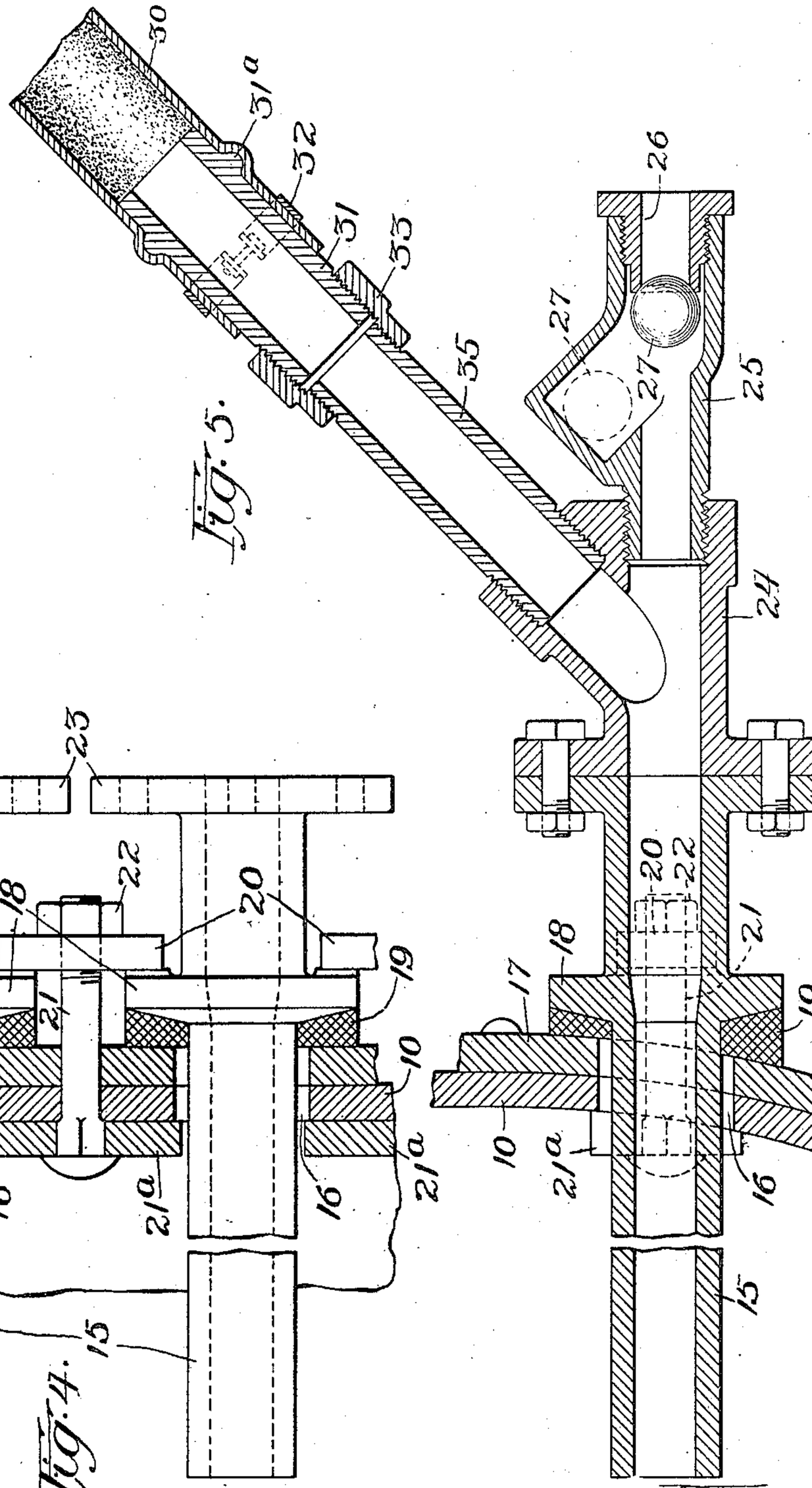

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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METALLURGIC CONVERTER.

942,973. Specification of Letters Patent. Patented Dec. 14, 1909.

Application filed October 15, 1909. Serial No. 522,704.

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 the converters for bessemerizing copper matte. Such converters frequently comprise a cylindric body or shell mounted horizontally upon friction rolls for easy axial turn, as may be requisite to insure proper delivery of the molten matte and ready discharge of the accumulated slags, white metal or blister copper, in course of treatment. Oftentimes, the twyers that project through the converter shell and the inner lining beyond, open out from a tight wind-box common to all of the twyers, the box being secured lengthwise to the converter shell over the twyer inlets.

An improved converter for bessemerizing copper matte, set forth in an application for Letters Patent filed in the United States Patent Office jointly by Elias A. C. Smith and myself on June 13, 1908, Serial No. 438,286, comprises an outer shell having an inner non-corrodible lining, free to shift relatively to the shell, with a set of twyers embedded in the lining and having continuous full delivery connection at their receiving ends with the blast supply, the twyer being preferably flexibly sustained to shift with the lining to thereby avoid breaking the twyers or the lining. In the embodiment of the invention described in said application, the wind-box was bolted lengthwise of the shell over the twyer inlets with the shell forming the inner wall of the box, and the twyers were flexibly united to the shell and wind-box, the flexible joints being rendered air tight by suitable packing and cement to thereby prevent leaks and the flow of fugitive air currents from the wind-box about the twyers, such as would tend to break down the lining.

The present invention seeks to provide an improved construction in which the twyers are similarly embedded in the lining but, instead of being united directly to the shell and wind-box by flexible, air-tight joints, extend loosely through the shell and are connected by flexible coupling pipes to the air supply. The liability of fugitive leaks through the lining and about the twyers is thereby obviated and the expense of construction and maintenance of the flexible air-tight joints at the twyer inlets is considerably reduced.

In the preferred form, the converter shell is provided with a non-corrodible lining free to shift relatively to the shell under the changing heat conditions, and metal twyers extend loosely through the shell and are embedded in and extend through the lining, being sustained from the shell by flexible, but not necessarily air-tight joints. The air is supplied to the twyers, preferably through a bustle pipe mounted on the shell at one side of the twyers and formed independent of the wall of the shell so as to obviate the necessity of maintaining air-tight joints between the air supply pipe or wind-box and the shell, as in the prior construction. Suitable flexible coupling pipes have air-tight connections with the bustle pipe and the projecting inlet ends of the twyers, so that the twyers may shift with the lining and, at the same time, have continuous full delivery connection with the air supply.

Referring to the drawings:—Figure 1 is a cross-section of the converter. Fig. 2 is an enlarged detail view in side elevation of a portion of the converter shell illustrating a number of twyers and their connections with the bustle pipe. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a plan view of some of the twyers on a further enlarged scale, showing the shell in section, and Fig. 5 is a detail section on the same scale of one of the twyers.

The converter has the usual cylindrical 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 the treatment. The converter shell is open at its upper side, and the sides of the opening are connected by a series of tie-rods 13. The shell 10, as in the construction described in the prior application referred to, is provided with a tenacious, coherent lining 14, arched over at the top and left free to expand under the high heat developed in the course of treatment, and formed, at the more exposed portions, preferably of magnesite brick luted with a cement composition comprising ground magnesite admixed with linseed or molder's core oil to the consistency of thick mortar. As in the prior construc-

tion, the twyers 15 are preferably formed of hollow metal castings square in cross-section to fit the lining brick. The twyers extend, in inclined position, through the lining and are embedded therein by use of the cement composition referred to.

In the present improved construction, the twyers 15 extend loosely through openings 16 in the shell and in the reinforcing plate 17 that is bolted or riveted to the shell, such openings being somewhat larger than the twyers to permit the shift thereof with the lining. Outside the shell, the twyers are provided with flanges or shoulders 18, and, preferably, washers 19 of lead or other soft metal are interposed between the shoulders 18 and the face of the plate 17. As shown, the contacting faces of the shoulder 18 and washer 19, are spherical, to form a flexible ball and socket joint. A series of clamps 20 connected by bolts 21 to the shell hold the twyers against displacement, each clamp overlapping the shoulders 18 of two adjacent twyers. Adjacent their inner headed ends, the bolts are provided with squared portions that engage blocks 21[a] held by the bolts against the inner face of the shell 10. The bolts extend through the shell and its reinforcing plate 17 and centrally through the clamps 20. Nuts 22 on the outer ends of the bolts detachably hold the clamps 20 in position.

Beyond the shoulder 18, each twyer is provided with a second shoulder or flange 23, to which is bolted a Y coupling 24. Within the outer end of the Y coupling is threaded a ball valve 25, of the Dyblie type, having a port 26 for the workman's punching tool, and a ball 27 that normally closes the port.

The air supply or bustle pipe 28 is formed independent of the wall of the shell and is mounted on the flanges 11 lengthwise of the shell and above the row of twyers. The bustle pipe is preferably cylindrical, as shown, is secured to the flanges by U-shaped straps 29 and is connected to the source of air supply in any suitable manner. A series of flexible coupling pipes 30 of rubber, rubber and canvas, or other suitable material, have air-tight connections with the bustle pipe 28 and the individual twyers. In the form shown, each flexible pipe 30, has threaded nipples 31 inserted in its ends, that are provided with rounded, annular shoulders 31[a] and are secured in air-tight manner to the pipe by suitable clamp rings 32. Union nuts 33 connect the nipples 31 at the ends of the flexible pipes 30, to short branch pipes 34 in the bustle pipe and to short pipes 35 that are threaded into the branches of Y couplings 24 on the separate twyers.

As described in the prior application referred to above, the high heat developed in the treatment expands the lining which, however, is not broken down but preserves its continuity and prevents leaks therethrough, despite the expansion, at all points, including the junction at the twyers, since the latter are free to shift with the lining. The improved manner of sustaining the "floating" twyers and of coupling them to an air supply pipe, obviates, as set forth, the danger of leaks from the air supply through the lining and the necessity of maintaining air-tight joints between the twyer inlets, shell and wind-box, and thereby reduces the cost.

It is obvious that the details of structure set forth may be varied without departure from the essentials of the invention.

I claim as my invention:—

1. In metallurgic converters, the combination with the outer shell, of the inner lining therefor, shiftable relatively to the shell under the changing heat conditions, the independent bustle pipe for the air supply, the separate twyers flexibly sustained with relation to the outer shell and embedded in said lining to shift therewith, and flexible pipes connecting the twyers and bustle pipe.

2. In metallurgic converters, the combination with an outer shell, of an inner lining therefor, shiftable relatively to said shell, a set of twyers embedded in said lining and free to shift therewith, an air supply pipe, and flexible pipes connecting said air supply pipe and said twyers.

3. In metallurgic converters, the combination with an outer shell, of an inner, non-corrodible lining shiftable relatively to the shell under the changing heat conditions, a set of blast twyers extending loosely through said shell and embedded in and extending through said lining to participate in the shift thereof, an external bustle pipe for the air supply, and flexible coupling pipes having air-tight connections with said bustle pipe and the projecting inlet ends of said twyers.

4. In metallurgic converters, the combination with an outer shell, of a series of metal twyers extending loosely through the shell, an external bustle pipe formed independent of the wall of said shell, mounted thereon at one side of said twyers and having flexible air-tight connections with the projecting outer ends thereof, and an inner lining in which the inner ends of said twyers are embedded.

5. In metallurgic converters, the combination of an outer shell having an internal lining, of a set of metal twyers flexibly sustained from said shell and embedded in and extending through said lining, an external bustle pipe mounted on said shell and formed independent of the wall thereof, and flexible coupling pipes having air-tight connections with said bustle pipe and with the projecting inlet ends of said twyers.

6. In metallurgic converters, the combination with an outer shell having an internal lining, of a set of twyers extending loosely through said shell and embedded in said lining, clamps bolted to said shells and engaging external shoulders on adjacent twyers, and an air supply pipe mounted on the shell at one side of said twyers and having flexible air-tight connections therewith.

7. In metallurgic converters, the combination with an outer shell having an internal lining, of a set of twyers extending loosely through said shell and embedded in said lining, soft metal washers interposed between external shoulders on said twyers and said shell, external clamps bolted to said shell and holding said twyers in place, an air supply pipe, and flexible pipes connecting the same to the projecting inlet ends of said twyers.

8. In metallurgic converters, the combination with the outer shell having an internal, relatively shiftable lining, of a set of twyers flexibly sustained from the shell by ball and socket joints and embedded in said lining to shift therewith, and an external air supply pipe having flexible air-tight connections with the inlet ends of said twyers.

9. In metallurgic converters, the combination with the outer shell having an internal, relatively shiftable lining, of a set of metal twyers extending loosely through the shell and embedded in said lining to shift therewith, soft metal washers interposed between said shell and external shoulders on said twyers, said washers and shoulders having spherical contacting surfaces, clamps bolted to said shell and overlapping the shoulders of adjacent twyers, an air supply pipe, and coupling pipes having air-tight connections with said supply pipe and the projecting inlet ends of said twyers, substantially as described.

10. In metallurgic converters, the combination with an outer shell having an internal lining, of a set of blast twyers loosely united to said shell and embedded in said lining, branched couplings on the outer ends of said twyers, ball valves secured to said couplings, a bustle pipe mounted on the shell at one side of said twyers and flexible pipes having air-tight connections with said bustle pipe and the branches of said couplings.

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Witnesses:
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