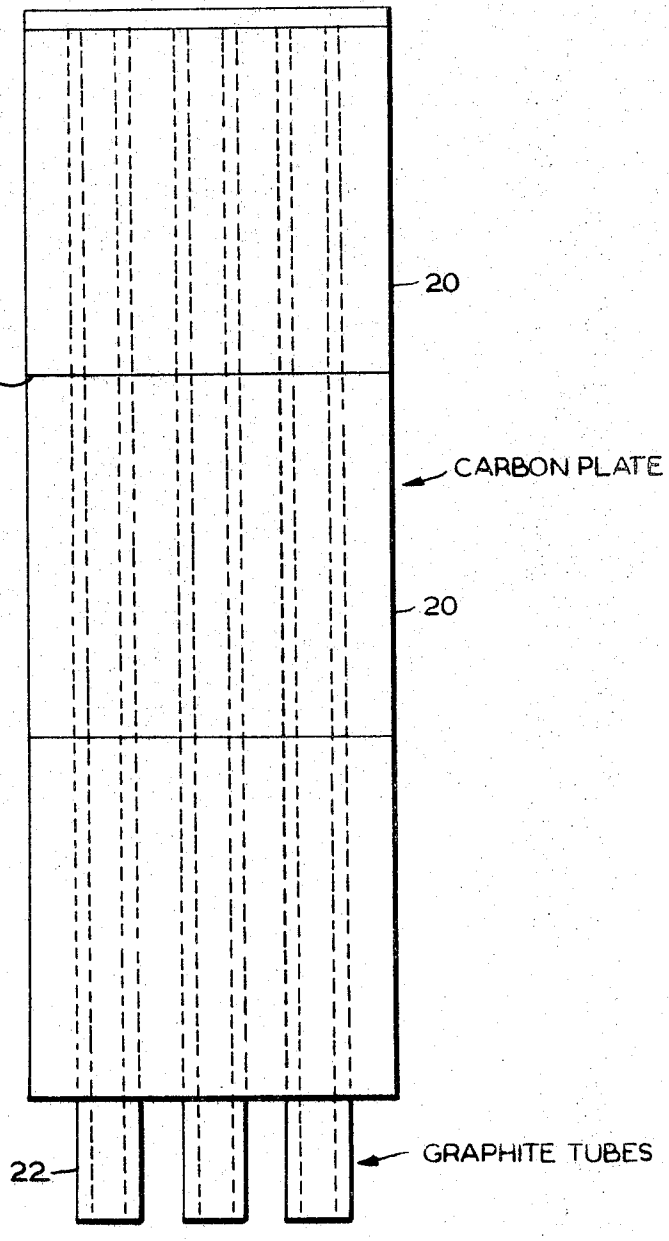
July 28, 1970 E. L. WARFIELD ET AL 3,521,874

GAS DIFFUSER UNIT FOR USE IN TREATING MOLTEN METAL

Filed May 12, 1967 2 Sheets-Sheet 1

Fig 1.
(PRIOR ART)



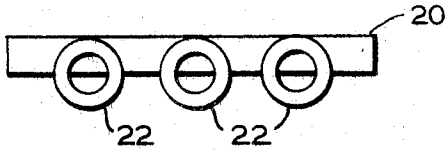


Fig 1a

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Filed May 12, 1967 2 Sheets-Sheet 2

Fig 2.

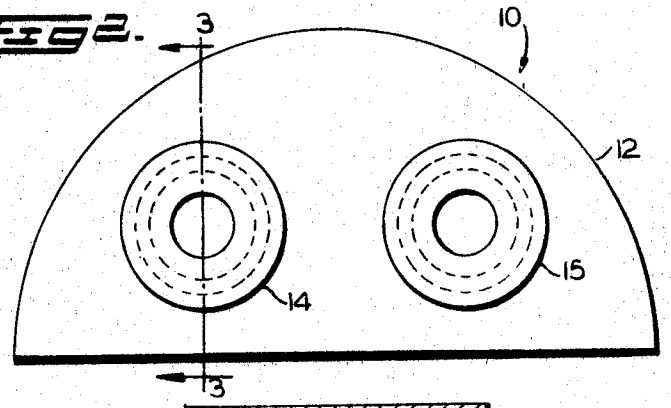
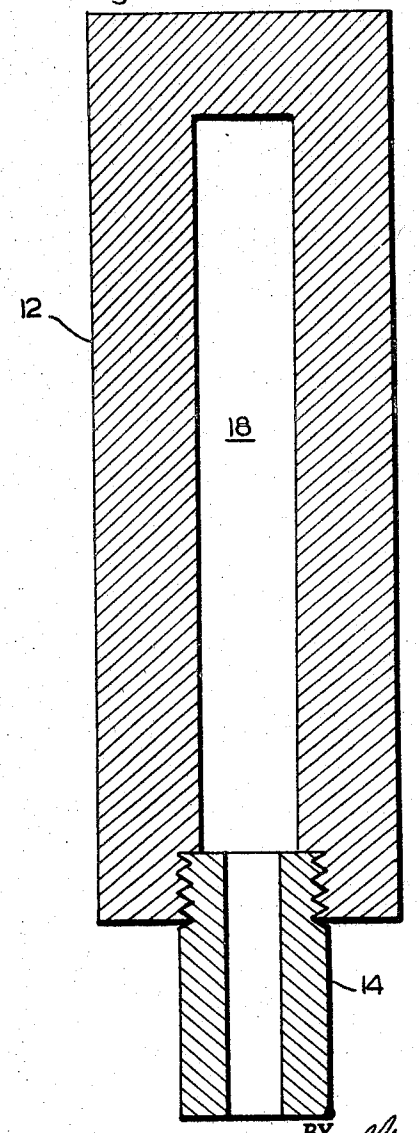


Fig 3.



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GAS DIFFUSER UNIT FOR USE IN TREATING MOLTEN METAL

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U.S. Cl. 266—41 6 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for and method of treating molten metal by introducing gas into the molten metal through the wall of a porous graphite body immersed therein.

This invention relates to the treatment of molten metal, particularly aluminous metal, and to apparatus for introducing a fluxing gas into the molten metal in the course of such treatment.

In the treatment of molten aluminum, it has been known to use a plurality of porous carbon plates cemented together to form a diffuser element for introducing an inert gas. The use of such elements has not been entirely satisfactory, however, due to leakage at the joints between plates. In addition, there was a tendency for molten metal to seep into such joints and plug the inlet tubes.

In accordance with the present invention, there is provided a gas diffusion unit having a one-piece body of porous graphite and one or more openings to an interior hollow portion or portions thereof. In order to avoid any joints through which leakage of the gas might take place, inlet tubes are securely attached to the one-piece body, preferably by means of threaded connections therebetween. A gas-tight system is thereby assured.

In the accompanying drawings: FIG. 1 shows a fluxing device as previously constructed; FIG. 2 is an end view of a porous graphite diffuser in accordance with the present invention, showing a pair of symmetrically disposed inlet tubes; and FIG. 3 is a sectional view along line A—A of FIG. 2.

Referring next to FIGS. 2 and 3 of the drawings, the gas diffuser unit **10** has a one-piece hollow graphite body **12** of controlled porosity to allow for the flow of gas therethrough. As shown, there are preferably two inlet tubes **14** and **15** also made of graphite (and having substantially the same thermal expansion characteristic) which are attached to the body **12** by threaded connections. The fluxing gas is introduced through these tubes into a hollow interior passageway **18** associated with each tube.

It will be noted that the passageways, which may be cylindrical as a result of boring the graphite body from one end thereof, are symmetrically disposed with respect to the semi-circular cross-section of body **12** and are spaced from its outer surface to provide a porous graphite wall of uniform thickness. Typical dimensions of such a unit are: a body of 37" length and 3½" radius, with bore holes of 1" diameter spaced apart about 2½" (center to center) and spaced inwardly to leave a wall thickness of about 1½". A commercially available porous graphite found to be suitable for the body **12** is "Grade No. 60" sold by Carbon Products Division of Union Carbide.

In contrast, as shown in FIG. 1, the construction previously used for this purpose had several carbon plates **20** cemented together, with gas inlet connections made from half-round tube sections **22** cemented onto adjacent faces of the plates. Not only was there a problem of leakage between plates, but the joints between the tubes and plates made it even more likely that excessive leakage would occur. In fact, it was regularly observed that molten metal seeped into the joints and soon plugged the inlet tubes. A further complication was that graphite tubes employed with the carbon plates resulted in a 3:1 difference in coefficient of thermal expansion, which made the maintenance of a gas-tight joint virtually hopeless.

The present invention overcomes these problems and provides a reliable means of introducing fluxing gas into the molten metal to be treated. This is accomplished simply by immersing the unit in the molten metal, with the inlet tubes exposed for connection to a supply of gas under pressure, and forcing the gas outwardly through the porous graphite.

While the present preferred embodiment of the invention and its method of use in treating molten metal have been described and illustrated, the invention may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. A gas diffuser unit for introducing fluxing gas into molten metal, comprising

a hollow elongated graphite body of substantially semicircular transverse cross-section adapted to be immersed in the molten metal, having a porous graphite wall and an adjoining interior chamber to receive the gas for transmission outwardly through said wall; and

tube means for introducing gas into the interior chamber of said body.

2. Apparatus according to claim **1**, in which said body has an interior cylindrical passageway extending parallel to its semicircular outer surface.

3. Apparatus according to claim **2**, including a plurality of parallel cylindrical passageways spaced inwardly from said outer surface the same distance.

4. Apparatus according to claim **3**, including one such passageway on each side of the axis of symmetry of said body.

5. Apparatus according to claim **1**, in which a graphite tube is joined to said hollow body by a threaded connection, said tube and body having substantially the same thermal expansion characteristic.

6. A gas diffuser unit for introducing fluxing gas into molten metal, comprising

a hollow porous graphite body having porous walls defining at least two interior chambers to receive the gas for transmission outwardly through said walls; and

tube means for introducing gas into each interior chamber of said body, said tube means and hollow body

having gas-tight joints therebetween, said body and the portion of said tube means forming the joints being adapted for immersion in the molten metal.

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203—86; 239—54, 55, 57, 592, 601; 261—77