PATENT SPECIFICATION (11) 1 568 099

1 568 099

(21) Application No. 1580/77 (22) Filed 14 Jan. 1977
(31) Convention Application No. 2 604 296
(32) Filed 2 Feb. 1976 in
(33) Fed. Rep. of Germany (DE)
(44) Complete Specification published 21 May 1980
(51) INT CL³ C21C 7/00
(52) Index at acceptance C7D 3G1E 3G3 3G7G 3G7Q

(54) METHOD FOR THE DEOXIDISING AND/OR DESULPHURISING OF A STEEL MELT

(71) We, MANNESMANN AKTIENGESELLSCHAFT, a joint stock company organised under the laws of Germany, of 4 Dusseldforf 1, Mannesmannufer 2, Germany,

do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The invention relates to a method for the deoxidising and/or desulphurising of a steel melt, and also to an apparatus for carrying out the method.

It is known that solid substances which are to be deoxidised and/or desulphurised may be blown while molten using a carrier gas which is introduced into the melt through conduits. *Inter alia* CaMg or similar solid substances are used in powder form for such purposes, the powder dissolving of course in the melt.

It is also known in a ladle or the like to introduce treatment gas into a melt, for example, through porous stoppers or the like.

A disadvantage of such a method is that it is restricted to one locality, i.e. the ladle must be brought before a specific installation, so that a considerable amount of time is required for carrying out deoxidising and/or desulphurising.

In addition, this known method is liable to disturb the melt owing to the upward lift which unavoidably acts on the immersion pipe.

The invention has as its general aim to provide a method and an apparatus with which it is possible to carry out deoxidising and/or desulphurising of a steel melt in a ladle without being restricted to a specific locality.

Accordingly in one aspect the present invention provides a method of deoxidising and/or desulphurising a steel melt, wherein a deoxidising and/or desulphurising substance is introduced into the melt in a hollow body of refractory material which floats in the melt and which is provided with apertures at an angle to the axis of the body so that when the substance is gasified by the heat from the melt, the gas passes through the apertures and the pressure of the emerging gas tends to turn the body in the melt.

In another aspect, the present invention provides an apparatus for carrying out the method set out above comprising a closed hollow body made of a refractory material and having apertures which extend in a horizontal plane through the wall of the body and having outlets which extend in a direction between the radial and the tangential, the hollow body either containing ballast or being of such a construction or of such a material that the apertures are located in use below the surface of the molten bath, and a deoxidising and/or desulphurising solid substance being present in the hollow body.

The invention will now be further described by way of example with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a front sectional view of one embodiment of apparatus in accordance with the invention;

Figure 2 is a cross-section taken on the line A—B at the level of the outlet apertures;

Figure 3 is a cross-section of a modified embodiment; and

Figure 4 is a cross-section on the line A—B of Figure 3.

The rotationally symmetrical hollow body 1 shown in Figures 1 to 4 which is made of refractory material is provided above the ballast mass 3 with outlet apertures 2 which, as can be seen in Figures 2 to 4, pass through the wall of the body at an angle to emerge radially and tangentially. The body I is closed at both ends and accommodates in its interior a ballast mass 3 and a deoxidising or desulphurising agent 4 which evaporates when heated.

In use, the body 1 floats in the melt with the apertures 2 below the surface thereof and after the body has been heated by the hot melt, gas which is produced passes out of the apertures 2 in such a manner, that after ferrostatic pressure has been overcome, the

body 1 is given a continual rotating motion. This not only guarantees that the gas is introduced into the melt, but also ensures that it is thoroughly distributed therein.

An example for a ladle treatment:

A cylindrical refractory body having a length of about 2000 mm and an external diameter of 500 mm and a wall thickness of 100 mm, with a filling of 50% by volume of deoxidising agent and 50% vol. ballast, with a specific gravity of 15 g/cm³ penetrates into the melt over about 75% of its length i.e. about 1500 mm. When the gas develops, the aforesaid rotating movement of the floating body is brought about.

In the case of multi-part hollow bodies, the means for connecting the parts can be used at the same time for ballast or for supporting the ballast mass.

WHAT WE CLAIM IS:—

1. A method of deoxidising and/or desulphurising a steel melt, wherein a deoxidising and/or desulphurising substance is introduced into the melt in a hollow body of refractory material which floats in the melt and which is provided with apertures at an angle to the axis of the body so that when the substance is gasified by the heat from the melt, the gas passes through the apertures and the pressure of the emerging gas tends to turn the body in the melt.

2. A method as claimed in Claim 1, wherein the apertures have outlet angles to the surface of the body which are between 90° and 180°.

3. Apparatus for carrying out the method claimed in either Claim 1 or 2 comprising a closed hollow body made of refractory material and having apertures which extend in a horizontal plane through the wall of the body and having outlets which extend in a direction between the radial and the tangential, the hollow body either containing ballast or being of such a construction or of such material that the apertures are located in use below the surface of the molten bath, and a deoxidising and/or desulphurising solid substance being present in the hollow body.

4. Apparatus as claimed in Claim 3 wherein the body is of multi-part construction.

5. Apparatus as claimed in either Claim 3 or 4 in which the body is rotationally symmetrical.

6. A method of deoxidising and/or desulphurising a steel melt as claimed in Claim 1 substantially as hereinbefore described with reference to the accompanying drawings.

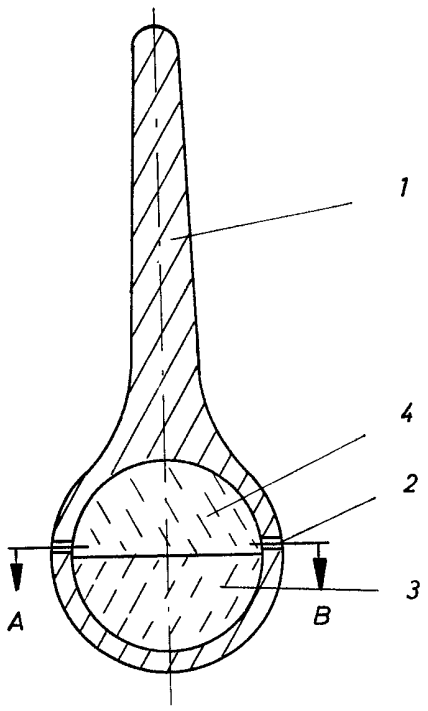
7. Apparatus for deoxidising and/or desulphurising a steel melt as claimed in Claim 3 substantially as hereinbefore described with reference to either Figs. 1 and 2 or Figs. 3 and 4 of the accompanying drawings.

For the Applicants:
LLOYD WISE, BOULY & HAIG,
Chartered Patent Agents,
Norman House,
105—109 Strand,
London, WC2R 0AE.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1980.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1568099 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 1

Fig.1



A-B

Fig. 2

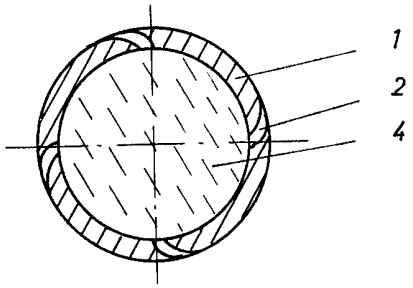


Fig.3

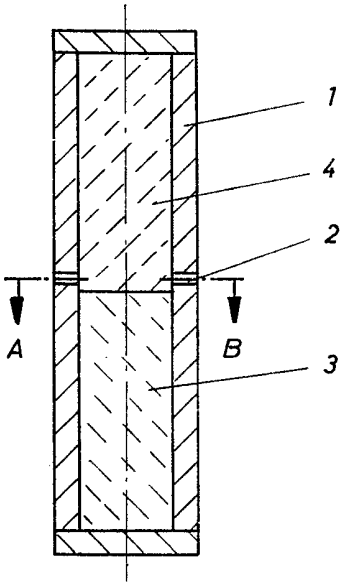


Fig.4