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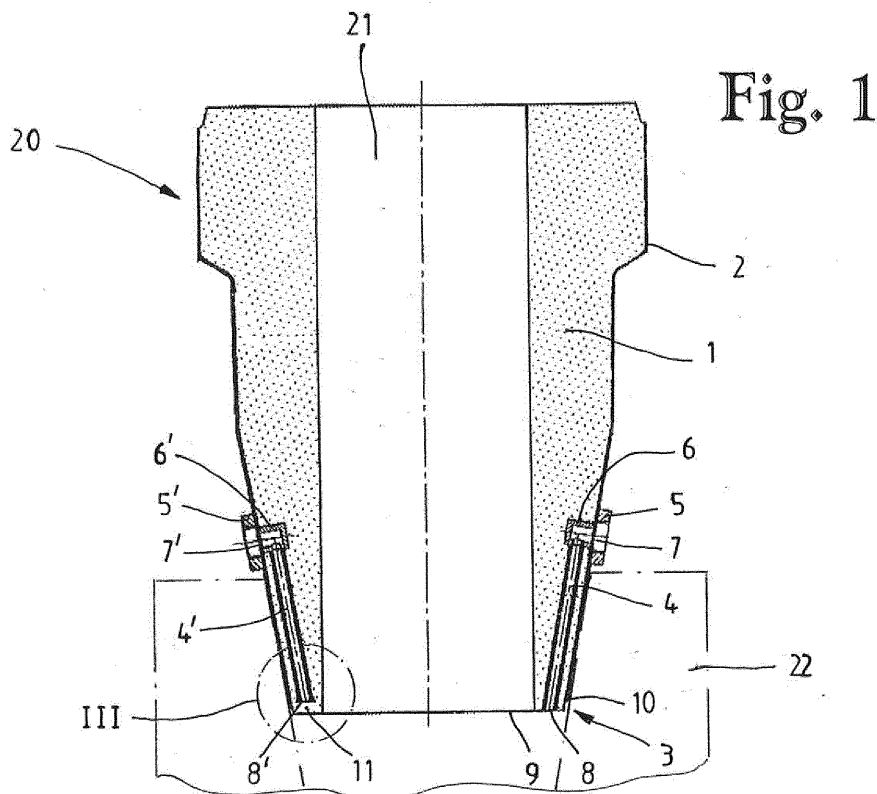
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(54) **A refractory sleeve, in particular a collector nozzle on a metallurgical vessel**

(57) A refractory sleeve, in particular a collector nozzle, which can be used on a metallurgical vessel, comprises an outer seal surface (3), a gas connection (5) disposed above the latter and a gas supply line (4) with an open outlet (8) preferably leading to its lower sleeve face surface (9). There is provided at least one further

gas connection (5') with a respective gas supply line (4') where the outlet (8') is closed. This outlet (8') is arranged here such that it can easily be opened and so a supply of gas in the direction of the lower sleeve face surface (9) is made possible by this gas supply line (4'). In this way the service life of the collector nozzle can be doubled.



Description

[0001] The invention relates to a refractory sleeve, in particular a collector nozzle according to the preamble to Claim 1.

[0002] Collector nozzles of this type are used for example when casting molten steel using the continuous casting method. They are fitted here, for example, to a slide closure on the bottom of a metallurgical vessel and there can be connected to the latter a submerged nozzle in the form of a ladle shroud or immersion pipe respectively, through which, during the casting, the molten steel flows into a distributor vessel or directly into a mould.

[0003] It is the purpose of the gas seal disposed between the collector nozzle and the submerged nozzle to prevent ambient air or oxygen from being sucked into the molten steel between the latter. In order to guarantee tightness, inert gas, the gas pressure of which counteracts the negative pressure produced here during casting, is preferably delivered to the joint between the collector nozzle and the submerged nozzle by a gas supply line. This can be implemented by means of a gas supply line on the outside, on the slide closure, or by means of a feed line in the submerged nozzle or in the collector nozzle. It is thus achieved that the molten steel flowing through the collector nozzle and the submerged nozzle can not come into contact with the ambient air and consequently does not absorb any oxygen.

[0004] However, it is a disadvantage of the previously known collector nozzles with a gas supply of this type that their operational capability is only restricted for casting until a ladle is emptied because at the end of the casting process the gas supply line of the gas seal is closed by molten droplets which have generally always found their way in - and which solidify upon cooling. The service life of the collector nozzle is limited by this.

[0005] The object underlying the invention is to avoid these disadvantages and to provide a refractory sleeve of the type specified at the start which, with structurally simple means, guarantees a longer service life in the form of multiple use.

[0006] This object is achieved according to the invention in that at least one further gas connection is respectively provided with a gas supply line where the outlet is closed and is arranged here such that it can be easily opened and so the supply of gas in the direction of the lower sleeve face surface is made possible by this gas supply line.

[0007] The additional gas supply line serves as a reserve line which is closed during the first casting process and is opened before casting of the molten metal is restarted by removing the closure in order to resume the function of the gas supply after the first casting process. In this way, the service life of the collector nozzle can be almost doubled with very little effort.

[0008] It is well known for collector nozzles of the type specified at the start to have a refractory body made of ceramic material which is covered with a sheet metal

jacket made of a suitable sheet steel. In order to facilitate production, the invention makes provision such that the two gas supply lines are formed by metal tubes embedded in the refractory body almost parallel to the sheet metal jacket and the upper end of which is provided with diverters welded onto the inside of the sheet metal jacket in a gas-tight manner and the interior of which is connected by openings in the sheet metal jacket to the gas connections also welded onto this on the outside in a gas-tight manner.

[0009] In order to facilitate the opening of the initially closed metal tube, the closure attached to the latter is preferably disposed in the refractory body approx. 5 mm away from the sleeve face surface and approx. 3 mm away from the sheet metal jacket.

[0010] In the following the invention is described in more detail by means of exemplary embodiments with reference to the drawings. These show as follows:

- Fig. 1 a collector nozzle according to the invention shown in section,
- Fig. 2 a section of the lower region of the collector nozzle according to Fig. 1,
- Fig. 3 detail III from Fig. 1, and
- Fig. 4 detail IV from Fig. 2, shown enlarged.

[0011] The collector nozzle 20 used as a refractory sleeve according to Fig. 1 is suitable for use as an exchangeable nozzle in a slide closure (not shown) on a metallurgical vessel. However, it could also be used on a sleeve changing apparatus or on a plug closure on the spout of a distributor vessel or the like.

[0012] This collector nozzle 20 consists of a refractory body 1 provided with a flow-through opening 21 made of ceramic material and which is surrounded by a sheet metal jacket 2 made of sheet steel. Before the casting operation a refractory submerged nozzle 22 can be connected to this sheet metal jacket in a gas-tight manner. For this purpose it has a gas seal 3 in the region of the connection.

[0013] According to the invention, this collector nozzle 20 is provided not only with a gas supply line 4 with an open outlet 8, but also with a further gas connection 5' with a respective gas supply line 4' where its outlet 8' is closed and is arranged here such that it can easily be opened and so it is made possible to supply gas through this gas supply line 4' in the direction of the lower sleeve face surface 9.

[0014] For these gas supply lines 4, 4' metal tubes are advantageously provided, the upper ends of which are each connected to a gas connection 5, 5'. These metal tubes are embedded, for example cast into the refractory body 1 diametrically opposite one another and almost parallel to the outer seal surface. Their upper end is provided here with diverters 6, 6', welded onto the inside of the sheet metal jacket 2 in a gas-tight manner, and the interior of which is connected by openings 7, 7' in the sheet metal jacket to the gas connections 5, 5'.

[0015] According to Fig. 1 or Fig. 2 the metal tube 4 opening out with its outlet 8 as far as the sleeve face surface 9 of the refractory body 1 is originally open, while the outlet 8' of the metal tube 4' is arranged, closed, above the sleeve face surface 9 of the refractory body 1.

[0016] Advantageously, the outlet 8' of the metal tube 4' is covered with a closure 11 in the form of removeable refractory ceramic. This outlet 8' is preferably offset by a distance 12 of approx. 5 mm from the sleeve face surface 9 of the refractory body 1 or a distance 13 of approx. 3 mm away from the face edge 10 of the sheet metal jacket 2.

[0017] A closure cap 11' made of synthetic material (e. g. plastic) can be placed on the metal tube 4' before pouring the refractory material into the sheet metal jacket so that this refractory material can not find its way in.

[0018] Advantageously, the one gas connection 5' is provided with dimensions different to those of the opposite gas connection 5 to distinguish between the connection line 5' and the open gas connection 5.

[0019] With the described arrangement it is guaranteed that during the casting process the open gas supply line 4 is first of all active by inert gas, preferably argon, being blown into the region between the collector nozzle and the adjoining submerged nozzle. The other gas supply line 4' is first of all closed and consequently inactive, the closure 11 ensuring that the tube 4' remains open above the closure during the heating and casting process.

[0020] After the end of the first casting process after emptying the molten steel in a ladle the gas tube 4, which is first of all open, is closed due to molten droplets which generally always find their way in. Before the second casting process the other gas tube 4' is then opened and correspondingly activated. This can easily be implemented by breaking open the refractory material and/or burning off the closure 11. In this way the collector nozzle is capable of correct operation for a second casting process, and this leads to practically doubling the service life of the sleeve.

[0021] In the described exemplary embodiment the collector nozzle is equipped with just one reserve tube 4'. Depending on the dimensions and/or the conditions for use of the collector nozzle it is also, however, in principle possible to equip it with more than two reserve tubes fitted evenly distributed in said collector nozzle.

[0022] The gas seal described is of course also suitable for sealing other components interacting with the submerged nozzle similarly to the collector nozzle.

[0023] In principle, more than two such gas connections could also be provided, where one would then be opened around the other gas supply line and would be used.

[0024] The gas tube 4' could be fastened over its entire length to the sheet metal jacket and be a component part of the latter.

Claims

1. A refractory sleeve, in particular a collector nozzle on a metallurgical vessel, comprising a gas connection (5) and a gas supply line (4) with an open outlet (8) preferably leading to its lower sleeve face surface (9), **characterised in that** at least one further gas connection (5') is respectively provided with a gas supply line (4') where the outlet (8') is closed and is arranged here such that it can be opened and so a supply of gas in the direction of the lower sleeve face surface (9) is made possible by this gas supply line (4').
2. The refractory sleeve according to Claim 1, **characterised in that** the outlet (8') of the closed gas supply line (4') is disposed above the lower sleeve face surface (9).
3. The refractory sleeve according to Claim 1 or 2, **characterised in that** the outlet (8') of the closed gas supply line (4') is provided with a closure (11) preferably made of refractory ceramic (11).
4. The refractory sleeve according to any of the preceding Claims 1 to 3, **characterised in that** the open gas supply line (4) and the closed gas supply line (4') are embedded in the refractory body (1) diametrically opposite one another and running almost parallel to the outer seal surface.
5. The refractory sleeve according to any of the preceding Claims 1 to 4, **characterised in that** the two gas supply lines (4, 4') are formed by one or more metal tubes embedded in the refractory body (1), the upper end of which is respectively connected to a diverter (6, 6') which is fastened in a gas-tight manner to a sheet metal jacket (2) surrounding the refractory body (1).
6. The refractory sleeve according to any of the preceding Claims 1 to 5, **characterised in that** the outlet (8') or the closure (11) of the closed metal tube is preferably disposed a distance (12) of approx. 5 mm away from the lower sleeve face surface (9) or a distance (13) of approx. 3 mm away from the sheet metal jacket (2) in the refractory body (1).

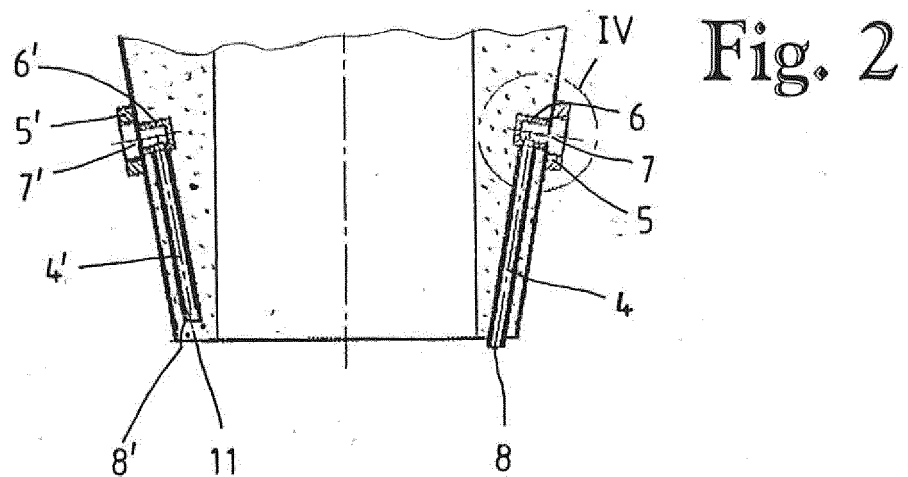
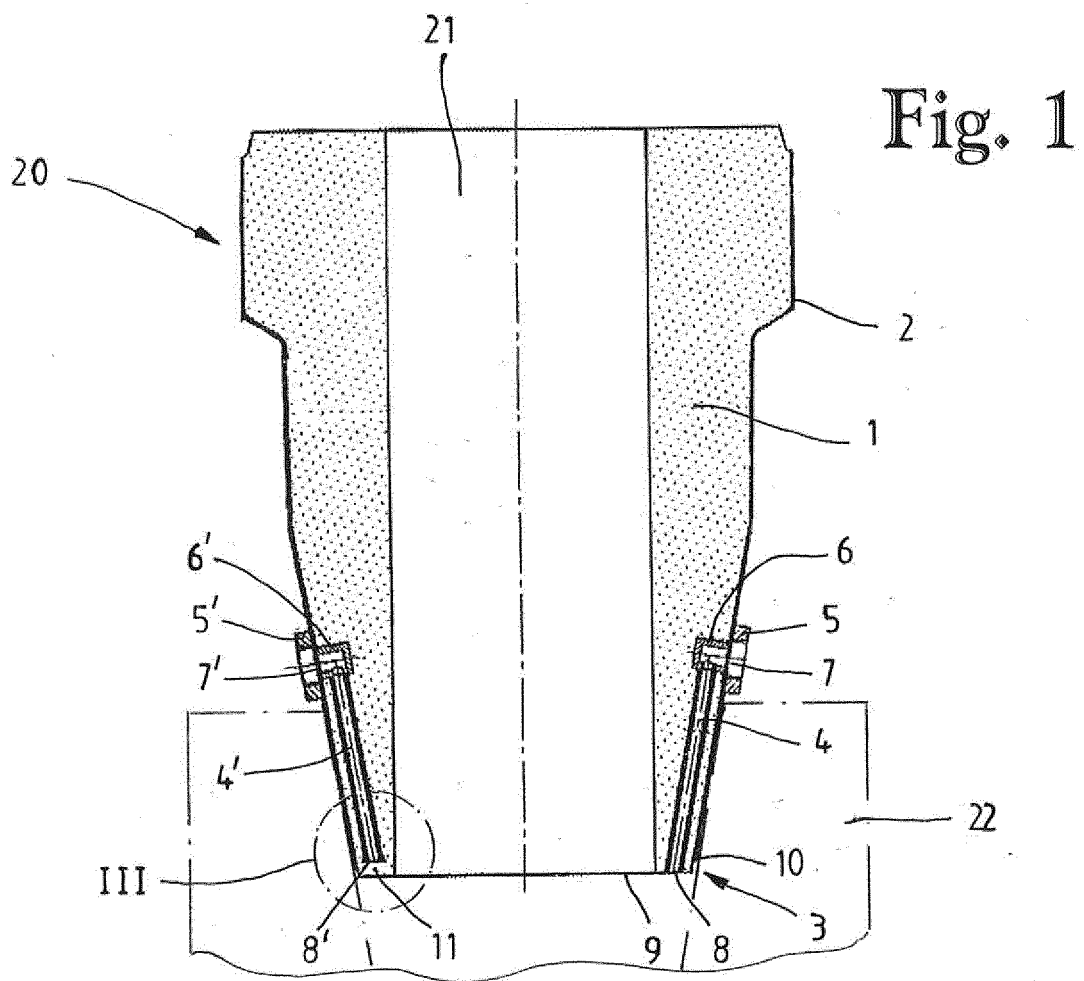


Fig. 3

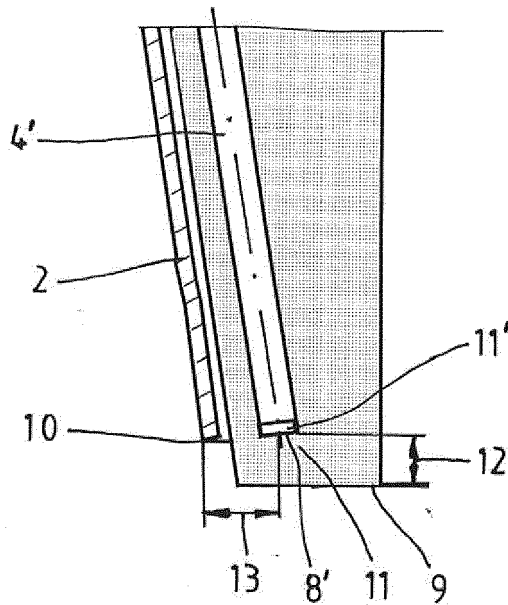
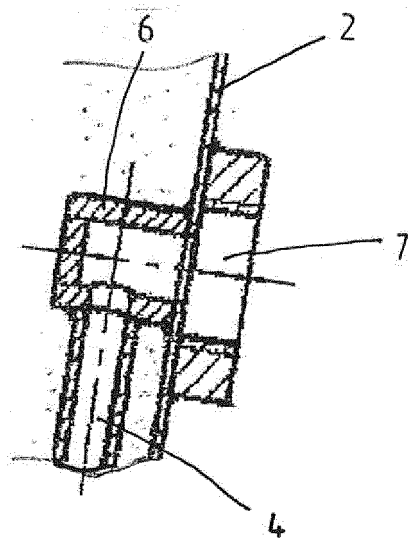


Fig. 4





EUROPEAN SEARCH REPORT

Application Number
EP 13 19 7230

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 672 490 B2 (RENARD JEAN-LUC [BE] ET AL) 6 January 2004 (2004-01-06) * the whole document * -----	1-6	INV. B22D41/50 B22D41/58 B22D37/00
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 March 2014	Examiner Rischart, Marc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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