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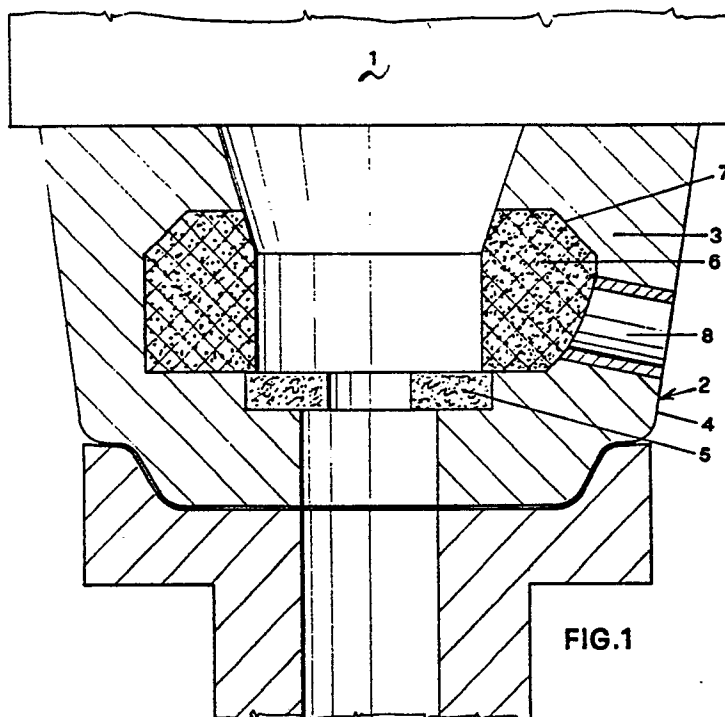
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54 Improvement in processes and devices for the continuous casting of metals.

57 An improvement in continuous casting processes for metals, characterised by blowing-in at least upstream of the ring (5) of the box gate (3) of a tundish (1) a gas which is chemically inert towards steel, through preformed passages leading to the casting hole.



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This invention relates to an improvement in processes and devices for the continuous casting of metals.

Known continuous casting plants for metals generally comprise an upper ladle for pouring the molten metal, and an intermediate tundish from which the molten steel is cast into the underlying ingot moulds.

The tundish base can be provided with a closure device either of the slide gate type or of the type comprising a box gate with a stopper plug.

Specifically, the box gate device consists of a nozzle of substantially frusto-conical shape comprising a central bore in which there is inserted a sized ring constructed preferably of zirconium or non-oxide products, which ensures a constant flow rate for the casting jet.

These known box gate devices suffer however from the problem of clogging of the hole in the ring, due to aluminium or various oxides contained in the steel depositing on it, and to the steel itself becoming pasty following cooling during its descent along the tundish.

According to the invention, clogging of the ring hole is prevented by blowing-in at least upstream of the ring a gas chemically inert towards steel, through preformed passages leading to the casting hole.

The device for implementing the process according to the invention is characterised by comprising, immediately upstream of the gate ring, a sheet metal jacket provided with a duct for feeding a gas chemically inert towards steel, and which surrounds an annular structure of refractory material provided with preformed passages leading to the casting hole.

The present invention is further clarified hereinafter in terms of two preferred embodiments with reference to the accompanying drawings in which:

Figure 1 is a partial vertical schematic section through a device for the continuous casting of steel constructed in accordance with the invention; and

Figure 2 is a modified embodiment thereof.

As can be seen from the figures, the device according to the invention is applied to the base of a tundish 1 of a continuous casting plant for steel. Specifically, it comprises a nozzle 2 consisting of a box gate 3 surrounded by a casing 4. The box gate comprises an aperture in which a ring 5 preferably constructed of zirconium or non-oxide products is housed.

Above the ring 5 there is housed an insert 6 of refractory material having a porosity greater than that of the box gate 3. More particularly, the porosity of the insert is between 27% and 35% whereas the porosity of the gate is between 10%

and 14%.

The insert 6 is surrounded by a jacket 7 and is provided with a duct 8 through which during casting there is fed a gas chemically inert towards steel, preferably argon. The blowing pressure is between 2 and 4 bars.

The device according to the invention enables the steel to be kept "under movement" in the region overlying the sized ring, thus preventing any clogging of the ring.

In a different embodiment, not shown in the drawings, the flow of the gas occurs not through the porous material of the insert 6, but through little ducts radially oriented in the refractory material and leading to the casting hole.

In the modified embodiment shown in figure 2, the box gate is provided with a further insert 6' which surrounds the underside of the casting ring 5 and is provided with an argon feed duct 8' in communication with the duct 8.

This embodiment has the further advantage of preventing any clogging downstream of the casting ring.

Also in this embodiment the flow of gas can occur, not through the material of the porous insert 6', but through little ducts provided in it.

Claims

1. An improvement in continuous casting processes for metals, characterised by blowing-in at least upstream of the ring (5) of the box gate (3) of a tundish (1) a gas which is chemically inert towards steel, through preformed passages leading to the casting hole.

2. An improvement as claimed in claim 1 characterised by blowing-in gas through a plurality of radial ducts provided in the refractory material surrounding the casting hole.

3. An improvement as claimed in claim 1 characterised by blowing-in gas through a layer (6) of refractory material having a porosity greater than that of the gate.

4. An improvement as claimed in claim 1, characterised by blowing-in argon.

5. An improvement as claimed in claim 3, characterised in that the blowing pressure is between 2 and 4 bars.

6. A device for implementing the improvement claimed in claims 1 to 5, characterised by comprising, immediately upstream of the ring in the box gate (3) of a tundish (1), a sheet metal jacket (7) provided with a duct (8) for feeding a gas chemically inert towards steel, and which surrounds a refractory material annular structure provided with preformed passages.

7. A device as claimed in claim 6 characterised

in that the refractory material annular portion has a porosity greater than that of the gate (3).

8. A device as claimed in claim 6, characterised by comprising a further refractory annular structure (6') positioned immediately downstream of the ring (5) in the box gate, and provided with preformed passages.

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9. A device as claimed in claim 8 characterised in that said structure (6) is connected to the feed duct (8) of the upper structure (6).

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10. A device as claimed in claim 7, characterised in that the porosity of the refractory material structure (6) is between 27% and 35%, whereas the porosity of the gate (3) is between 10% and 14%.

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