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DEVICE FOR SUPPLYING MOLTEN METAL INTO A MOULD OF A CONTINUOUS CASTING MACHINE

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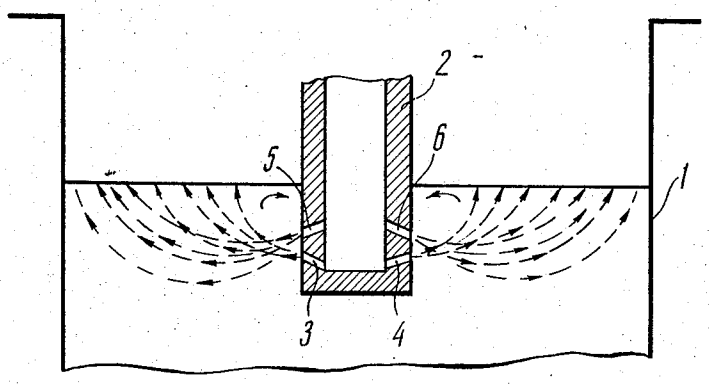


FIG. 1

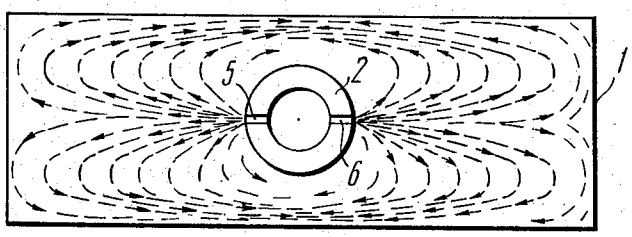


FIG. 2

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DEVICE FOR SUPPLYING MOLTEN METAL INTO A MOULD OF A CONTINUOUS CASTING MACHINE

Evgeny Ivanovitch Astrov, Moskovskoe Shosse, 135, kv. 52; Anatoly Dmitrievitch Klipov, Ulitsa Gastello, 15, kv. 12; and Nicolai Alexandrovitch Polushkine, Moskovskoe Shosse, 89, kv. 30, all of Gorky, U.S.S.R.; and Victor Savelievitch Routes, 7 Parkovaya Ulitsa, 15, kv. 12, Moscow, U.S.S.R.

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ABSTRACT OF THE DISCLOSURE

A sleeve extending axially into the interior of a mold for discharging liquid metal into the mold through lateral channels formed in the sleeve and disposed circumferentially therein in groups, each of which has at least two channels therein at different levels and inclined towards one another such that the axes of the channels intersect outside the sleeve and within the mold.

The present invention relates to metallurgy, and more particularly to devices for feeding liquid metal into a mold of a continuous casting machine.

Known in the prior art is a device for feeding liquid metal into a mold, said device being essentially a sleeve to be mounted into the mold and provided with lateral channels for discharging the liquid metal. These channels are arranged horizontally and on the same level. Emerging therefrom streams of metal wash off the solidifying skin at the mold walls, which results in an uneven solidification front. The section formed in such a manner possesses both internal and external defects, such as longitudinal and transversal cracks, ripples and slag inclusions.

There have been attempts made to provide a sleeve with channels whose axes are inclined in such a manner that the streams of metal emerging therefrom are directed upwards. This eliminated the washing off of the solidifying skin. The metal streams, directed upwards, cause, however, streams on top of the metal at the mold walls, disposed opposite to the outlet holes of the channels; these streams are likely to entrap the slag below the surface of the section. On the remaining considerable area of the metal meniscus, the slag remains stationary; on cooling, it thickens, which results in the formation of ripples on the section surface due to the penetration of slag into gaps between the mold wall and the solidifying skin detaching from the mold wall.

An object of the present invention is to eliminate the above-said disadvantages.

Other objects and advantages of the present invention will become more fully apparent from what will be stated thereafter.

The principal object of the present invention is to provide a device ensuring the feed of liquid metal into the mold in streams that do not wash away the solidifying skin; and are not capable of entrapping the slag below the section surface: these streams are only capable of bringing the slag into a slow movement, which does not allow the slag to cool down and thicken.

This object is achieved by the provision of a device for feeding the liquid metal into the mold of a continuous casting machine, while device is essentially a sleeve provided with lateral channels to discharge metal, said sleeve being mounted into the mold; the channels, according to the invention, are disposed along the perimeter in such

groups, at least one pair in each group, the channels being disposed in each group on two levels, and inclined towards one another such that the axes of the channels intersect outside the sleeve.

The details of the present invention will become more fully apparent from a consideration of the following description of an exemplary embodiment of the device according to the invention, taken in conjunction with the appended drawings, in which:

FIG. 1 illustrates the device provided with two pairs of channels in a longitudinal section.

FIG. 2 is a plan view of the same device.

The device is essentially constituted by a sleeve **2** to be placed inside a mold **1** (FIGS. 1 and 2); in the lateral walls of said sleeve there are provided lower channels **3**, **4** and upper channels **5**, **6**. The longitudinal axes of each pair of channels intersect outside the sleeve at a certain distance from its walls. The pair, comprising the channels **3** and **5**, is disposed along the perimeter of the sleeve **2** diametrally opposite the pair composed of channels **4** and **6**. Each lateral channel has the diameter of 16 mm. and is inclined at an angle of 25°.

The device operates in the following manner. Metal, emerging in streams through the channels **3**, **4**, **5** and **6**, is cast into the cavity of the sleeve **2**, provided in the mold **1**. The streams, emerging from the channels **3** and **4**, are directed upwards, while the streams from the channels **5** and **6** are directed downwards. The streams, emerging from the channels **3** and **5**, respectively intersect the streams, emerging from the channels **4** and **6**. In the points of intersection of the longitudinal axes of the channels, the metal streams, when meeting each other, lose a portion of the kinetic energy and form a number of streams flowing at a slower speed, the direction of which streams are indicated in the drawings by arrows all over the surface of the metal meniscus in the mold.

Emerging from the channels **3**, **4**, the streams are directed upwards and are under a higher static pressure than the streams that are directed downwards. Under this condition, the intersection of each pair of the streams results in the direction of the resulting guiding stream upwards. Under the action of said streams, the protective layer of slag on the surface of the metal meniscus will be in the fluid-flow state. Such a state of the slag results in the formation of a lining uniform as to its height and thickness in the gap between the mold walls and the solidifying skin. This enables to obtain a section having a smooth surface.

In conformity with another embodiment of the device, there may be obtained similar results if on each side of the sleeve there are provided four channels for directing four streams into one point, and four other streams into another point disposed in relation to the first point on the opposite side of the sleeve. Under this condition, two pairs of the streams, intersecting in one point, emerge from two upper channels and two lower channels, whose axes are disposed at an angle to each other in a manner similar to that of the lateral ribs of a pyramid.

Though the present invention is described in connection with a preferred embodiment thereof, it is evident that there may be conceived modifications and variations thereof that do not depart from the idea and scope of the invention, as defined by the appended claims.

We claim:

1. In a continuous casting machine having a mold, an improvement comprising a sleeve extending axially into the interior of the mold for discharging liquid metal into the mold, said sleeve being provided with lateral channels for the discharge of liquid metal, said channels being

disposed circumferentially in said sleeve in groups, each group having at least two channels therein at different levels and inclined towards one another such that the axes of the channels intersect outside the sleeve and within the mold.

2. The improvement as claimed in claim **1** wherein said groups are arranged in diametric opposition in said sleeve.

3. The improvement as claimed in claim **2** wherein the lower of the channels in each group is inclined upwardly and the upper of the channels is inclined downwardly.

4. The improvement as claimed in claim **3** wherein each channel in each group is inclined at an angle of 25° with the horizontal.

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J. SPENCER OVERHOLSER, *Primary Examiner.*

V. K. RISING, *Assistant Examiner.*