United States Patent

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[33] **Switzerland**
[31] **14606/68**

[54] **METHOD FOR CONDUCTING A DUMMY BAR INTO A MOLD**
1 Claim, 1 Drawing Fig.

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[51] **Int. Cl.** **B22d 11/08**
[50] **Field of Search** 164/274, 282, 284, 82, 89, 281, 283, 412, 138

[56] **References Cited**
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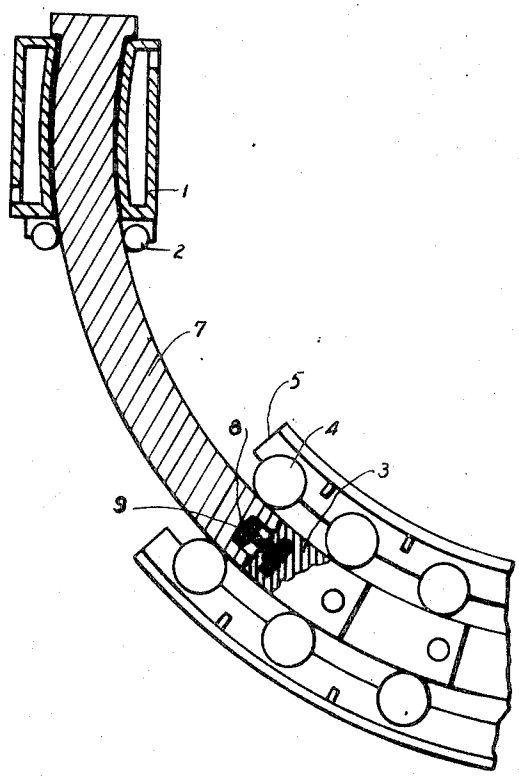
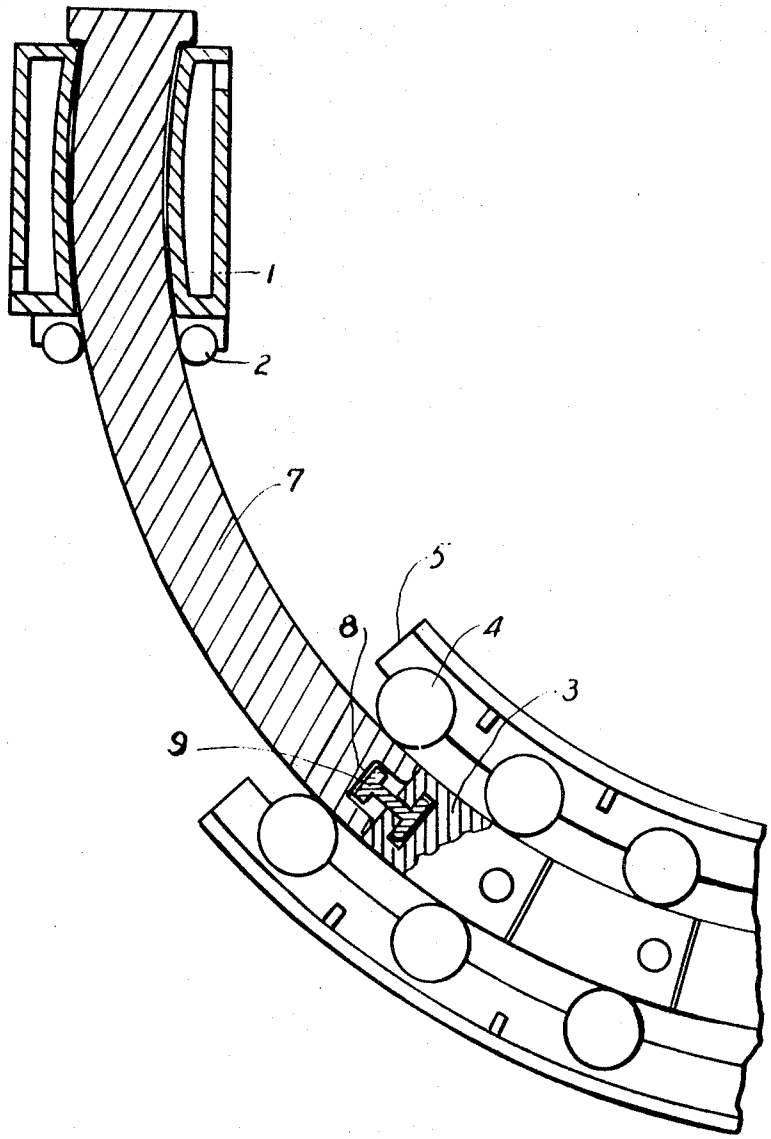
ABSTRACT: A dummy bar is conducted up into an open-ended continuous casting mold by a guide element which is lowered down through the mold, connected to a dummy bar below the mold and moved up until the dummy bar is received in the mold. The guide element is then disconnected from the dummy bar and lifted up out of the mold.





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METHOD FOR CONDUCTING A DUMMY BAR INTO A MOLD

The invention relates to a method of introducing the dummy bar into an open-ended continuous casting mold with the aid of a guide element and to apparatus for performing the method.

Continuous casting is performed by pouring the metal into an open-ended mold. Before pouring begins the exit end of the mold must first be closed by the insertion of the upper end of a dummy bar to prevent the metal poured into the mold from a pouring vessel from running out of the mold. Only after the solidified metal and the dummy bar head have formed a connection can the casting be withdrawn from the mold. After leaving the mold the casting passes through a secondary cooling zone which usually begins near the exit end of the mold and in which the casting continues to be cooled while being supported and guided by rollers. The withdrawal force is applied to the casting by driven rollers which press against the dummy bar.

For closing the mold the dummy bar is usually introduced from below by reverse rotation of the driven rollers and the dummy bar thus passes upwards between the rollers located in the secondary cooling zone.

It has been found that quite frequently, and particularly when smaller sections are being cast, the rollers for guiding the casting in the uppermost part of the secondary cooling zone, i.e., directly below the mold, are unnecessary as far as their purpose as guiding means for the casting is concerned. However, they are needed for guiding the dummy bar.

Particularly when flexible dummy bars are used, guide means below the mold for guiding the dummy bar are needed, because these dummy bars would otherwise kink and they could not be inserted into the mold without causing damage. Insertion is in any case a difficult process because the dummy bars, or at least their heads, must have a cross section that is only slightly smaller than that of the mold cavity they are intended to plug.

On the other hand, the presence of rollers directly below the mold has several drawbacks. Breakouts of metal usually occur directly below the mold, and the liquid metal usually occur directly below the mold, and the liquid metal damages these guide rollers and makes them inoperative. When this happens, extensive repair work is needed which, in addition to the expenses for the repairs, also reduces the economic efficiency of the plant by the loss in production time.

Furthermore, it is desirable that the casting should be intensely cooled, particularly immediately below the mold, in order to form as quickly as possible a solidified skin of maximum thickness and strength for containing the still liquid core of the casting. This reduces the risk of a breakout of liquid metal and permits the casting rate to be increased. If guide means, such as rollers or the like, are located closely below the exit end of the mold, these rollers are in the way and obstruct intense secondary cooling which is carried out, for instance, by means of spraying nozzles or cooling plates. Thus, the cooling of the casting is restricted to the spaces that remain between the several rollers so that major regions of the casting surface are shielded from this cooling.

It is the object of the present invention to provide a method and apparatus for guiding a dummy bar whereby the above-mentioned drawbacks can be avoided and a dummy bar can nevertheless be guided by a guide element into the exit end of the mold without damaging the mold, and whereby guiding means located directly below the mold are not needed.

The method proposed by the present invention for achieving this object consists in lowering a guide element through the mold along a path extending from the mold to the upper end of the roller apron for the casting, in coupling this guide element to the dummy bar and in introducing the dummy bar upwards into the mold while maintaining said coupling connection between the guide element and the dummy bar.

The apparatus for performing this method consists of a guide element in the form of a guide rod or bar having a cross section which at least in parts conforms with the cross section of the mold cavity, and which is provided at its lower end with connecting means for coupling said guide element to the upper end of the dummy bar.

These and other features of the invention will be described more particularly by reference to an embodiment of the invention which is shown in the accompanying drawing, which is a side view, partly in section, of a continuous casting mold and roller apron, showing a guide bar in position for conducting a dummy bar into the mold in accordance with the invention.

The drawing shows an open-ended mold 1 which has a curved mold cavity. Small rollers 2 which participate in the movements of the mold are mounted close to the exit end of the mold. These rollers are not part of the roller apron located in the secondary cooling zone but serve for minimizing any tendency of the casting to assume a rhomboid cross section.

Drive means not shown in the drawing, such as the driven rollers in a combined withdrawing and straightening unit, are operated to move a dummy bar 3 approximately to the level of the uppermost pair of rollers 4 in roller apron 5. At the same time, or previously thereto, a guide element 7 is lowered from above through the mold until its leading end likewise arrives at the upper end of the roller apron 5, said guide element being guided through the mold along a path determined, for instance, by the mold walls or the rollers 2. In the illustrated embodiment the guide element 7 is a bar whose cross section throughout its length substantially conforms with the cross section of the mold cavity. However, it would also be possible to use a guide bar whose cross section conforms only in certain parts of its total length to the cross section of the mold cavity. Thus, weight saving could be achieved by using a guide bar whose cross section is recessed at certain intervals or by using a guide bar of hollow construction or in similar ways. Likewise, for the purpose of reducing the weight, the guide bar 7 may consist of wood or plastic. At its lower end it is provided with coupling means for making a connection with the upper end 9 of the dummy bar 3, said coupling means having the form of say a recess 8 permitting said upper end 9 of a dummy bar 3 to be inserted into said recess 8. Generally, the coupling connection may simply consist of an opening of suitable dimensions in the guide bar 7 for the reception of the extreme upper end of the dummy bar 3 or of the dummy bar head and may be an ordinary plug and socket connection. In the illustrated embodiment the recess 8 is adapted for the reception of the upper part of a rail section which is inserted into the dummy bar 3.

When the dummy bar 3 has thus been connected to the guide bar 7, the dummy bar 3 is raised and plugged into the mold 1 by withdrawal rollers being driven in reverse, the connection between guide bar 7 and dummy bar 3 being maintained during this operation. Due to the guidance thus given to the leading end 9 of the dummy bar 3, it will enter the mold without damaging the same.

The upper end of the guide bar 7 may be provided with hooks or the like, not shown in the drawing, permitting the guide bar to be handled by hoisting means, for instance, for lowering the guide bar through the mold. Such hoisting devices may also assist in pulling the dummy bar 3 upwards into the mold, conventional means being provided for locking the coupling connection between the guide bar 7 and the dummy bar 3.

After the dummy bar 3 has been inserted into the exit end of the mold, the guide bar 7 is disconnected from the dummy bar and is withdrawn upwards clear of the mold so that other preparatory work prior to casting, such as sealing the dummy bar head, etc., can be done.

The scope of the invention is not limited to the embodiments that have been particularly described. It can also be applied to casting plants of different types of construction, such as casting plants comprising a straight mold with straight or curved roller apron.

I claim:

1. A method of introducing a dummy bar into an open-ended continuous casting mold characterized in that, in suc-

cession, a rigid elongated guide element having a cross section which conforms in certain parts of its total length has been inserted following the words to the cross section of the mold cavity is lowered down through the mold and the uppermost pair of guide rolls in the roller apron, the lower end of the guide element is then connected to the upper end of a dummy bar which is to be received in the mold and which is below the mold, the guide element is then moved up through the mold until the dummy bar connected thereto is received in the mold, and the guide element is then disconnected from the dummy bar and is lifted out of the mold.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,627,016 Dated December 14, 1971

Inventor(s) Max Burkhardt

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, lines 2 and 3, cancel "has been inserted following the words".

Signed and sealed this 6th day of June 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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