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Lanque

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[54] **COOLING DEVICE FOR A CONTINUOUS CASTING WHEEL**

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[51] **Int. Cl.** **B22d 11/06**

[58] **Field of Search**.....164/82, 87, 276, 278, 283

[56] **References Cited**

UNITED STATES PATENTS

3,319,700	5/1967	Bray et al.	164/278 X
3,596,702	8/1971	Ward et al.	164/87
3,650,316	3/1972	Petit	164/283 X
3,667,537	6/1972	Petit	164/283 X

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[57] **ABSTRACT**

Cooling device for a continuous casting wheel, in which the casting groove has a U-shaped cross-section, having a substantially even thickness, and whose opening faces outwards, with the securing of the groove onto the hub of the wheel being achieved by shoes forming clips, the hub being provided with teeth or projections around the periphery to permit more efficient cooling of the bottom of the U-shaped casting groove in the wheel.

10 Claims, 2 Drawing Figures

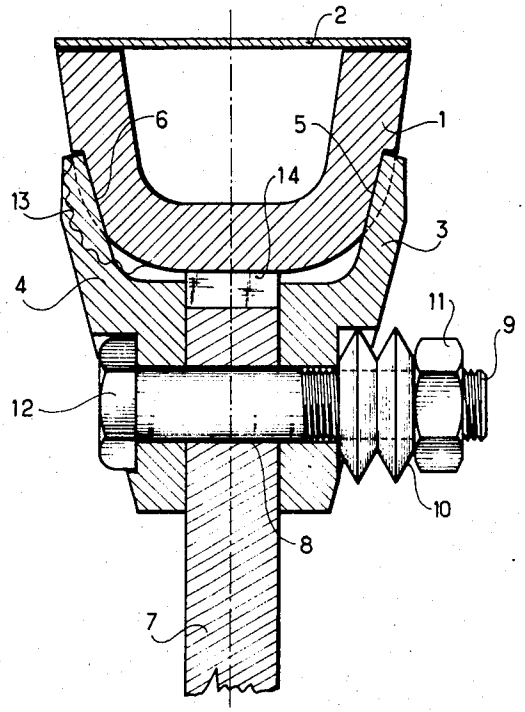


FIG.1

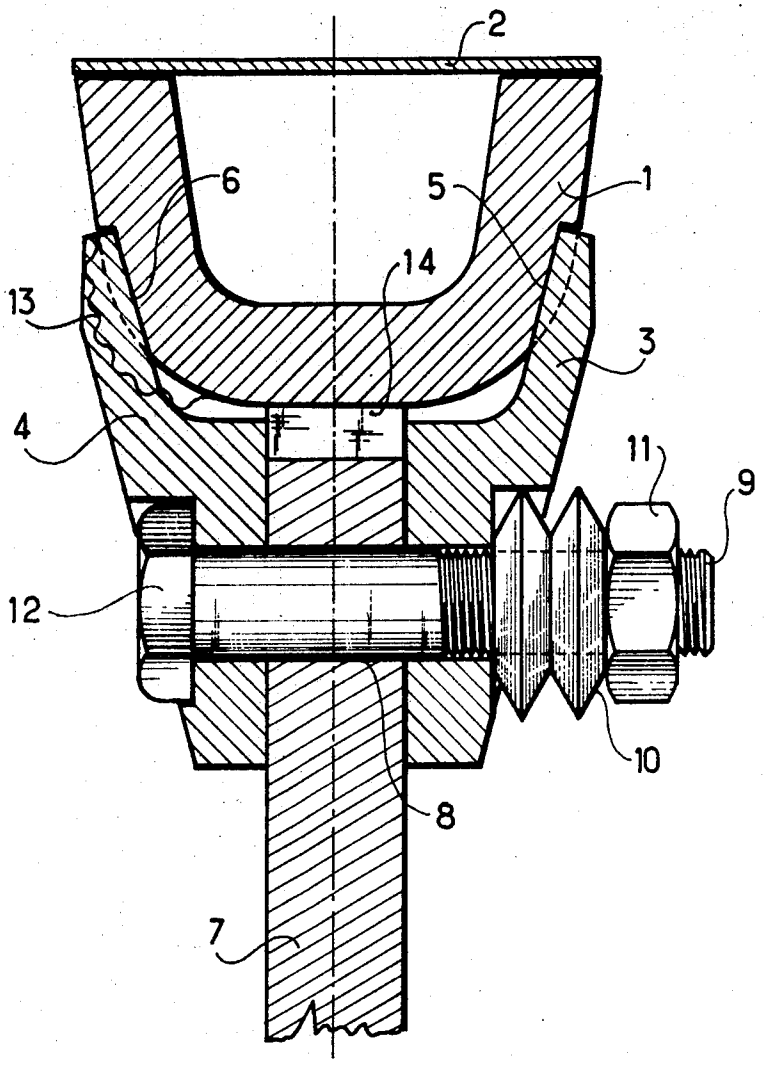
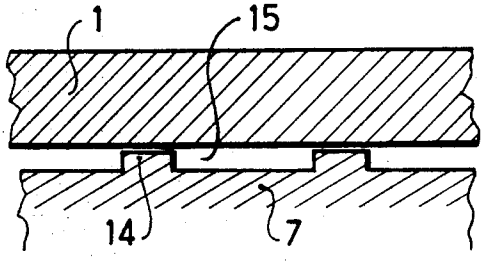


FIG.2



COOLING DEVICE FOR A CONTINUOUS CASTING WHEEL

BACKGROUND OF THE INVENTION

Description of the Prior Art

The prior art devices for cooling a continuous casting wheel incorporates in addition to the conventional main elements or means employed by the casting wheels in machines of this type, a plurality of cooling casings appropriately arranged at the periphery of the wheel, near the groove formed in the periphery of the wheel, to constitute in combination with the belt closing the said groove, the mold into the interior of which there is to be introduced a molten metal which, after cooling, will form the product which it is desired to obtain.

It is known that the main difficulty encountered in continuous casting resides in the correct cooling of the casting wheel, since the casting wheel is required to continually receive a substantial quantity of heat derived from the metal to be processed, it thus being necessary to progressively evacuate such heat by the most reliable and most rapid means.

Apart from the conductivity of the metal from which the wheel flange is manufactured, use is made of the action of a cooling fluid which is circulated against the surface of the casting wheel, due to surface exchanges, which permits the continuous evacuation of the heat given off by the molten metal to the casting wheel.

The cooling casings previously proposed by the Applicant in the above-identified applications permit the systematic sprinkling and spraying of the greater portion of the lateral surfaces of the casting wheel, and also of the belt for closing the groove formed in the wheel.

SUMMARY OF THE INVENTION

In order to improve the efficiency of such cooling, Applicant has proposed to modify both the shape of the wheel flange and, consequently, the mode of securing the said flange on the hub.

According to the present invention, the flange of the casting wheel is no longer of Y-section, but has the shape of an open U which is substantially widened out or flared towards the exterior, the two legs and the base of the U constituting, together with the covering belt, the mold proper. This may be said, to some extent, to amount to the suppression of the "tail" of the aforementioned Y. This construction makes it possible, in an extremely advantageous manner, to cool equally well the now "freed" portion of the flange surface, which said portion is directed towards the interior of the wheel.

It is a further advantage of the novel flange shape to provide substantially constant thickness, this being extremely advantageous from the viewpoint of heat exchange and preventing the creation of heat accumulation zones which are difficult to cool.

Yet a further advantage of the novel shape according to the present invention resides in the fact that homogeneous expansion becomes possible, due to the existence of a privileged or preferential longitudinal direction afforded for that purpose.

With regard to the securing of the novel wheel flange on its hub according to the present invention, this is effected with the aid of lugs or projections of small thickness in the circumferential direction and disposed at intervals, preferably in pairs, on either side of the hub, said lugs constituting gripper elements externally engaging the two limbs of the U. Each gripper element is closed on the U with the aid of an appropriate transverse gripping means suitably applied to the opposite ends of the securing lugs for example, a bolt extending through the hub from one side to the other and constantly applying against each other the free ends of the two lugs.

It is also possible to incorporate a staggered distribution of the lugs with each one thereof being then directly fitted onto the hub.

The securing of the lugs is preferably resilient in such manner as to take into account the expansion caused by heat.

In order to improve the engagement of the lugs on the flange, the latter may be slightly notched opposite each lug.

In order to achieve maximum freeing of the convex face of the mold, this being the face directed towards the interior of the wheel, the lugs which face it are appropriately notched.

The wheel hub will also be "freed" by restricting to the strict minimum the number of contact surfaces or ridges between the flange and the hub, while making use of the notches thus obtained in the periphery of the hub for providing for the sprinkling of the convex face of the flange at that point in a known manner.

Further features and advantages of the invention will be disclosed in the course of the following description given with reference to the accompanying drawings, the description and drawings relating to a preferred embodiment of the invention given purely by way of non-limitative example. In the Figures, the description of which follows hereinbelow, like reference numerals have always been used for like elements.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a radial section through the peripheral portion of a casting wheel constructed according to the invention; and

FIG. 2 is a detail view of a portion of the surface of connection between the casting wheel and the hub thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The wheel flange 1 has a U-shaped cross-section, as seen in FIG. 1, the thickness of which is practically uniform, and which is open and upwardly flared, with the base portion being of slightly oval shape.

The belt 2 is used for closing the mold, the section of the latter thus being of substantially trapezoidal shape, wherein the long base is radially outward and the two ridges or edges at the apex are slightly rounded.

The lugs or projections 3 and 4 are provided for securing the wheel 1 to the hub 7, which said lugs or projections engage in notches 5 and 6 formed for this purpose in the thickness of the two limbs of the U-shaped wheel 1.

The hub 7 is formed with bores 8 through which extend the bolts 9 for securing the lugs 3 and 4. A seat is formed in the outer face of each of the lugs 3 and 4, to

permit the arrangement in the first of the said seats of resilient washers **10**, through which the gripping effect is exerted by the nut **11** on the lugs **3** and **4**, while permitting free expansion play of the flange due to the heating thereof. With regard to the other seat formed in the lug **4**, this seat serves for containing the head **12** of the bolt **9**.

When required, the external surface of the flanges **3** and **4** may comprise cooling fins **13** (shown in thin lines in FIG. **1**) the purpose of which it is to increase the heat exchange surface between the flange and the cooling fluid.

Alternatively, one of the lugs, for example **4**, may be formed integral with a wheel hub **7**.

In a variation, it would also be possible to provide a slightly or definitely staggered arrangement of the securing lugs **3** and **4**.

Particular importance must be attached to the surface of connection between the wheel **1** and the hub **7** thereof. In fact, substantial recesses may be formed at this point, thus affording, as previously stated, ready access to the portion of the flange directed toward the center of the wheel, that is, radially inwardly, so as to provide for the appropriate cooling of the bottom portion. The liquid jets emanating from the cooling casings can then be orientated in appropriate direction so as to achieve the desired cooling effect, unless it is preferred to make use of other means, which are known per se, for effecting such cooling in substantially radial directions, within the hub which is appropriately designed.

A developed view of the manner of construction of the surface of this connection is shown in FIG. **2**. The surface of the hub **7** is formed with a predetermined number of teeth or projections **14** which alone contact the flange **1**.

It will be appreciated that an extremely small number of such teeth or projections **14**, the number of which may, if necessary and desirable, be reduced to only three, which will be adequate to correctly center and position the flange **1** relative to its axis of rotation with hub **7**. Thus, it becomes possible to make use of the entire gap **15** between two adjacent teeth **14**, to achieve the appropriate cooling of the inner portion of the wheel flange.

Without departing from the scope of the present invention, it will be possible to modify some of the provisions thereof or to replace some of the means described therein by equivalent means.

What is claimed is:

1. A device for the cooling of a continuous casting wheel, said wheel comprising a peripheral wheel flange removably secured on a central hub, a casting groove formed in the external periphery of said flange and being covered by an appropriate belt, said cooling device being characterized in that the cross-section of said casting groove is U-shaped, the aperture of said U being directed radially outward toward the exterior, and further including a plurality of cooling spaces formed between the inner periphery of said flange and the outer periphery of said hub.

2. A device according to claim **1**, characterized in that the walls of said casting groove are of substantially uniform thickness.

3. A device according to claim **1**, further comprising lugs or projections fitted on said hub and arranged in pairs, to constitute gripper elements for clamping said flange to effect the securing of the wheel flange on the hub.

4. A device according to claim **1**, characterized in that, the securing of the wheel flange onto said hub is effected by means of lugs fitted on said hub and being disposed alternatingly on either side of said hub.

5. A device according to claim **3**, characterized in that the lugs are of small thickness in the circumferential direction.

6. A device according to claim **3**, characterized in that the gripping means are resilient and lock at one of their ends, the lugs against the wheel hub, the flange being clamped and maintained in position by the opposite ends of the lugs.

7. A device according to claim **3**, characterized in that the flange is formed with notches in which are lodged the associated ends of the lugs.

8. A device according to claim **3**, characterized in that the portions of the lugs facing the inner periphery of the flange are shaped as to afford a free space on the side of the said inner periphery.

9. A device according to claim **1**, characterized in that the central hub has formed on its external periphery, at least three teeth which, alone, provide for contact with the inner periphery of the flange.

10. A device according to claim **1**, characterized in that the radially inward bottom of the flange is subjected to the action of a cooling fluid.

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