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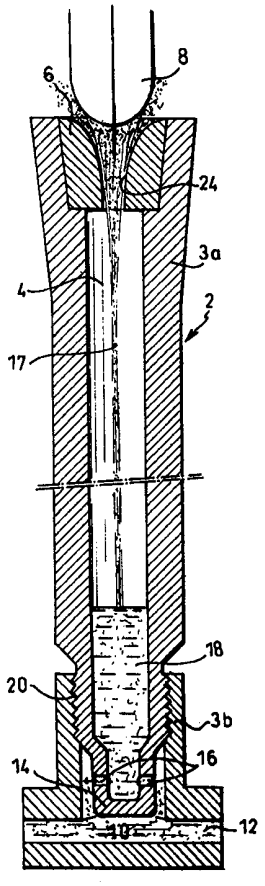
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(54) Title: POURING SPOUT FOR A CONTINUOUS–CASTING MOLD

(57) Abstract

The invention concerns a pouring spout for the transfer of a molten metal from a distributor into a continuous–casting ingot mold. It is comprised of a body made of a tubular part (3a) delimiting an essentially vertical pouring channel (4), and an essentially horizontal part (3b) delimiting a distribution channel (10), these two parts beings assembled to each other, notably by screwing. The pouring channel (4) has an upper end designed to be connected to the distributor and a lower end emptying into the distribution channel (10), the latter having at least two orifices emptying into a continuous–casting ingot mold, an obstacle (14) being located in the pouring channel (4). The spout has tight means for retaining the molten metal above the obstacle (14).



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POURING SPOUT FOR A CONTINUOUS-CASTING MOLD

The present invention concerns a pouring spout for the transfer of a molten metal from a distributor into a continuous casting ingot mold, comprised of a body made up of a tubular part that delimits an essentially vertical pouring channel, and an essentially horizontal part that delimits a distribution channel, these two parts being assembled to each other, notably by being screwed together, the pouring channel having an upper end designed to be connected to the distributor and a lower end emptying into the distribution channel, the latter having at least two orifices emptying into the continuous-casting ingot mold, an obstacle being placed in the casting channel.

In the continuous casting of steel it is desirable for a number of reasons to assure a tranquil and regular flow of the metal into the ingot mold.

This is why a pouring spout of the above type was conceived (FR 2 739 313); it has an obstacle in the path with the molten metal that is designed to induce a deficiency in charging the stream of steel and thus to slow down this stream.

Such an arrangement presents numerous advantages. It reduces the cross section locally available for the passage of the molten metal. This has the effect of slowing down the rate of flow and improving the inner filling of the spout. The flow is thus rendered more regular. The symmetry of the flows in the right and left halves of the ingot mold and the regularity in time are notably improved.

However, this spout has a shortcoming. It is comprised of a tubular part at the lower end of which a hollow part, essentially in the form of an inverted T, is screwed. A perforated piece, which constitutes the obstacle for obtaining a charge deficiency placed in the path of the molten metal, is inserted between a shoulder or collar of the inverted T part and the lower end of the tubular part. Due to the improvement in internal filling, a quantity of steel accumulates above the perforated piece that forms the

obstacle.

The thread that assembles the tubular part and the part in the form of an inverted T is then subjected to ferrostatic pressure. Since the threads are not tight, leaks are observed at its level. Even the addition of cement does not make the thread tight.

The object of the present invention is a spout that remedies this disadvantage. According to the invention, the spout has means for tightly retaining the molten metal upstream from the obstacle.

According to a first embodiment, the obstacle is formed in a single piece with the tubular part. Consequently, the joint is eliminated and the leaks are thus suppressed. According to a preferred embodiment, the part of the pouring channel located above the obstacle has a lining of a material different from that of the tubular part.

The obstacle can be made of the same material as the body or of a material different from the body.

According to a variant, the tight means of retention are comprised of a lining inserted into the pouring channel and integrating the obstacle. This lining should of course extend sufficiently high in the pouring charnel so its edges are above the maximum level of molten metal.

According to a preferred variant, the insert having a smaller obstacle of passage than the diameter of the pouring channel is provided in the upper part of the body.

Other characteristics and advantages of the present invention will be manifested in reading the following description with reference to the attached Figures.

Figure 1 is a cross-sectional view of a first mode of implementing the invention.

Figure 2 is a cross-sectional view of a second mode of implementation of the invention.

In Figure 1 the general reference 2 designates the spout of the invention. Its body is comprised of two parts: an upper tubular part 3a and a lower part 3b in the form of an inverted 'T'. These two parts are assembled together by a thread 20 in the example shown.

Part 3a delimits a vertical pouring channel 4. The upper end of the channel has a seat 6 for a stopper rod 8. This seat is constituted by a insert 22 produced separately and maximized in a recess of the body of the spout. This insert has ie, hole 24 whose diameter is definitely smaller than that of the pouring channel 4.
The channel 4 empties at its lower end into a distribution channel 10 essentially perpendicular to the channel 4. The channel 10 has at least two louvers 12 through which the molten metal flows into the ingot mold. Other louvers may also be provided. An obstacle 14 is provided at the lower part of the pouring channel 4. This obstacle 14 can assume different forms. In the embodiment example shown it is comprised of a tube with a diameter smaller than that of the pouring channel 4. This tube has orifices 16 perpendicular to the wall of the channel 4. The obstacle 14 brakes the flow of the stream of steel 17 that the stopper rod 8 allows to pass. A certain amount of molten metal 18 accumulates above the obstacle 14. According to the invention, the obstacle 14 is in one piece with the tubular part 3a. In other words, these two elements form an integral component, produced in a single operation of isostatic pressing. There is thus no joint between the obstacle 14 and the tubular part 3a. Leaks are thus suppressed.

On the other hand, due to the substantial difference between the cross section of the hole 24 and that of the channel 4, a substantial variation will be noted in the flow rate at the level of the stopper rod, which is expressed by a relatively slight variation in the height of the molten metal 18 above the obstacle, which helps to maintain the stability of flow in the ingot mold.

In the example shown, the tubular part 3a is of a single material. Two or more different materials, compressed in one or more operations can also be used. The obstacle 14 can be of a different material than that of the tubular part proper. Or an internal lining of a material more resistant to erosion than that of the body 3 can also be provided in the pouring channel 4. Finally, the obstacle 14 and the lining can be of the same material but different than that of the body. But the obstacle 14 and the tubular part 3a are still in one piece even in these cases.

Figure 2 shows another embodiment variant of the invention spout. The obstacle 14 is constituted of a jacket 26 produced separately from the body of the spout and which is terminated at its lower end by a tube 14 of smaller diameter, identical to that of Figure 1. This jacket or lining is inserted into the pouring channel 4. It is retained at its upper part by a collar 26a that rests on a shoulder of the tubular Part 3a. Its edge is clearly above the level of the molten metal 18. Leaks are thus impossible. As a variant, the lining 26 could be supported by its lower end on a shoulder of the tubular part 3a.

Other modes of actualizing the tightly sealed retention means could be envisioned without departing from the scope of the invention. It could thus be possible to provide a spout in two assembled parts involving an obstacle 14 constituting a separate piece, as in the embodiment mode of Figure 3, and the edge of which does not rise above the level of the molten metal 18, but in which the cylindrical part of the part 3b would be prolonged upward so as to go beyond the level of the molten metal.

CLAIMS

1. Pouring spout for the transfer of a molten metal from a distributor into a continuous-casting ingot mold, comprised of a body made up of a tubular part (3a) that delimits an essentially vertical pouring channel (4), and an essentially horizontal part (3b) that delimits a distribution channel (10), these two parts being assembled to each other, notably by screwing, the pouring channel (4) having an upper end designed to be connected to the distributor and a lower end emptying into the distribution channel (10), the distribution channel (10) having at least two orifices emptying into the continuous-casting ingot mold, an obstacle (14) being located in the pouring channel (4), characterized in that it has tight means of retaining the molten metal upstream from the obstacle (14).

2. Pouring spout according to claim 1, characterized in that the obstacle (14) is formed in a single piece with the tubular part (3a).

3. Pouring spout according to any one of claims 1 and 2, characterized in that the part of the pouring channel (4) located above the obstacle (14) has a lining of a material different than that of the body (3).

4. Pouring spout according to any one of claims 1-3, characterized in that the obstacle (14) is of a material different than that of the tubular part (3a).

5. Pouring spout according to any one of claims 1-4, characterized in that the tight means of retention are comprised of a lining (26) inserted into the pouring channel (4) and integrating the obstacle (14).

6. Pouring spout according to any one of claims 1-5, characterized in that an insert (22) having an orifice (24) with a diameter smaller than that of the pouring channel (4) is provided at the upper part of the tubular part (3a)

FIG.1

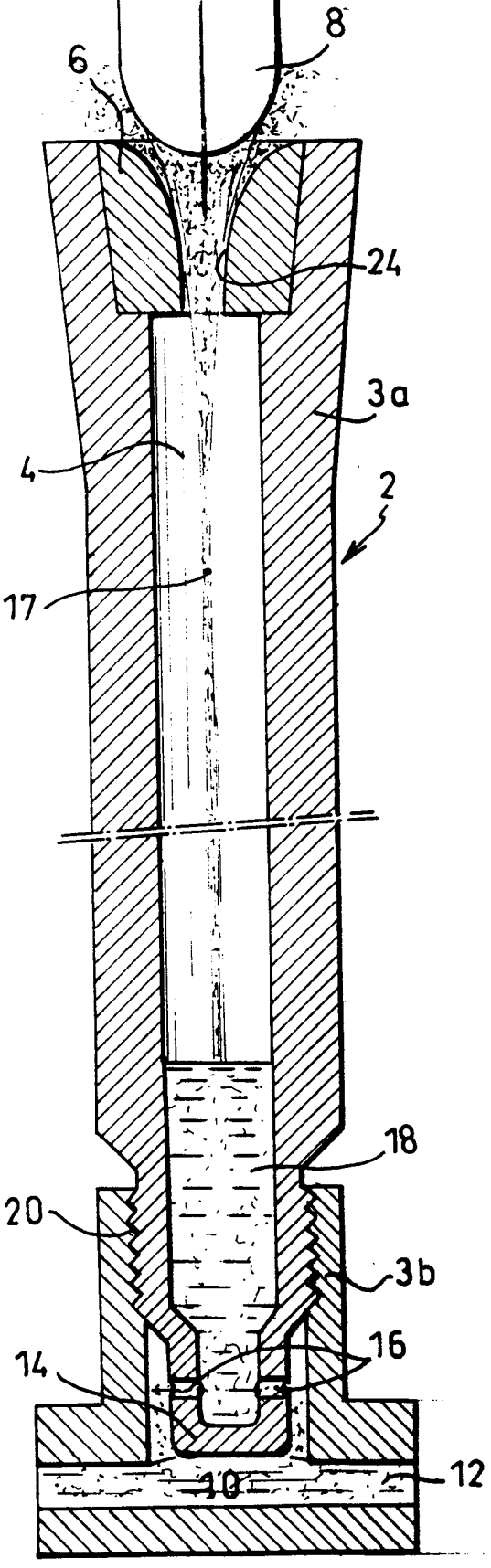
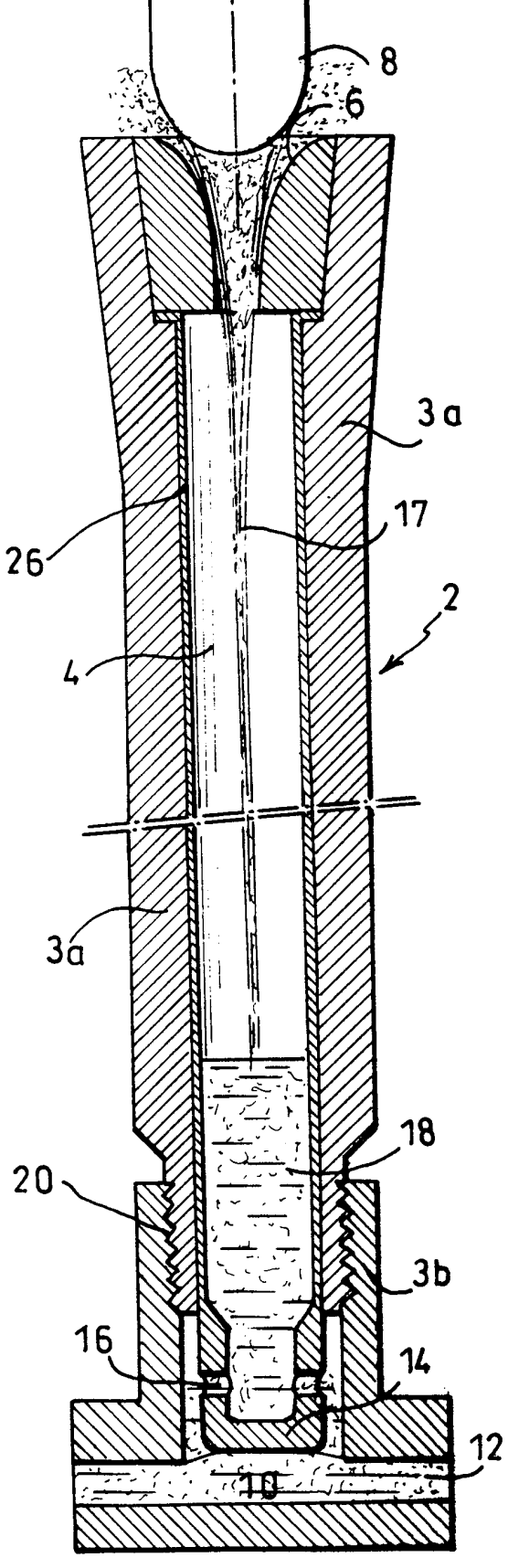

8
6
24
3a
4
2
17
18
20
3b
16
14
12
10

FIG.2


8
6
3a
26
17
2
4
3a
18
20
3b
16
14
12
10

INTERNATIONAL SEARCH REPORT

I. national Application No
PCT/EP 98/04469

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B22D41/50

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B22D

Documentation searched other than minimumdocumentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 739 313 A (USINOR SACILOR SOCIÉTÉ ANONYME ET AL.) 4 April 1997 cited in the application see claim 1; figures 1,2 ---	1
A	FR 2 243 043 A (VEREINIGTE ÖSTERREICHISCHE EISEN- UND STAHLWERKE - ALPINE MONTAN A.G.) 4 April 1975 see claim 1; figures 1,2 ---	1
A	EP 0 492 231 A (DIDIER-WERKE AG) 1 July 1992 see claim 1; figure ---	1
A	DE 34 20 835 A (CHAMOTTE- UND TONWERK KURT HAGENBURGER) 5 December 1985 see claim 10; figure 1 ---	1
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1 295 169 A (VESUVIUS CRUCIBLE COMPANY) 1 November 1972 see claim 1; figure 2	1

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Information on patent family members

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