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 [21] Appl. No. **853,896**
 [22] Filed **Aug. 28, 1969**
 [45] Patented **May 11, 1971**
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 [32] Priority **Aug. 31, 1968**
 [33] **Germany**
 [31] **P 17 58 902.5**

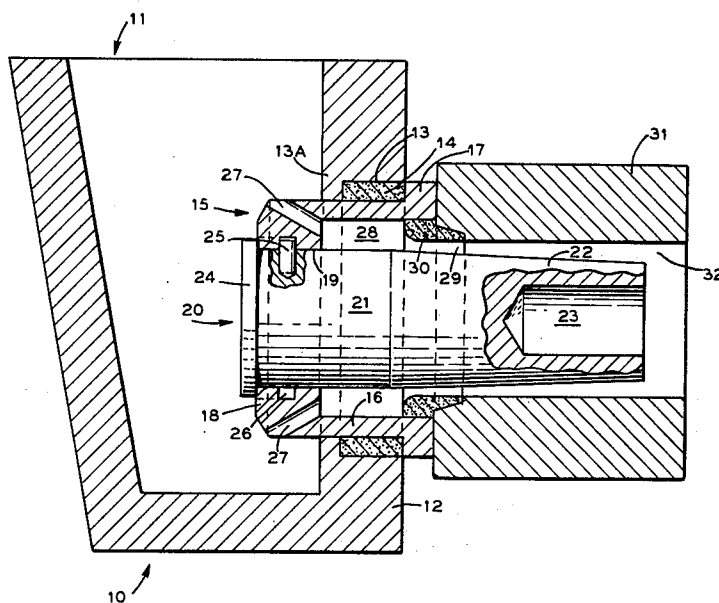
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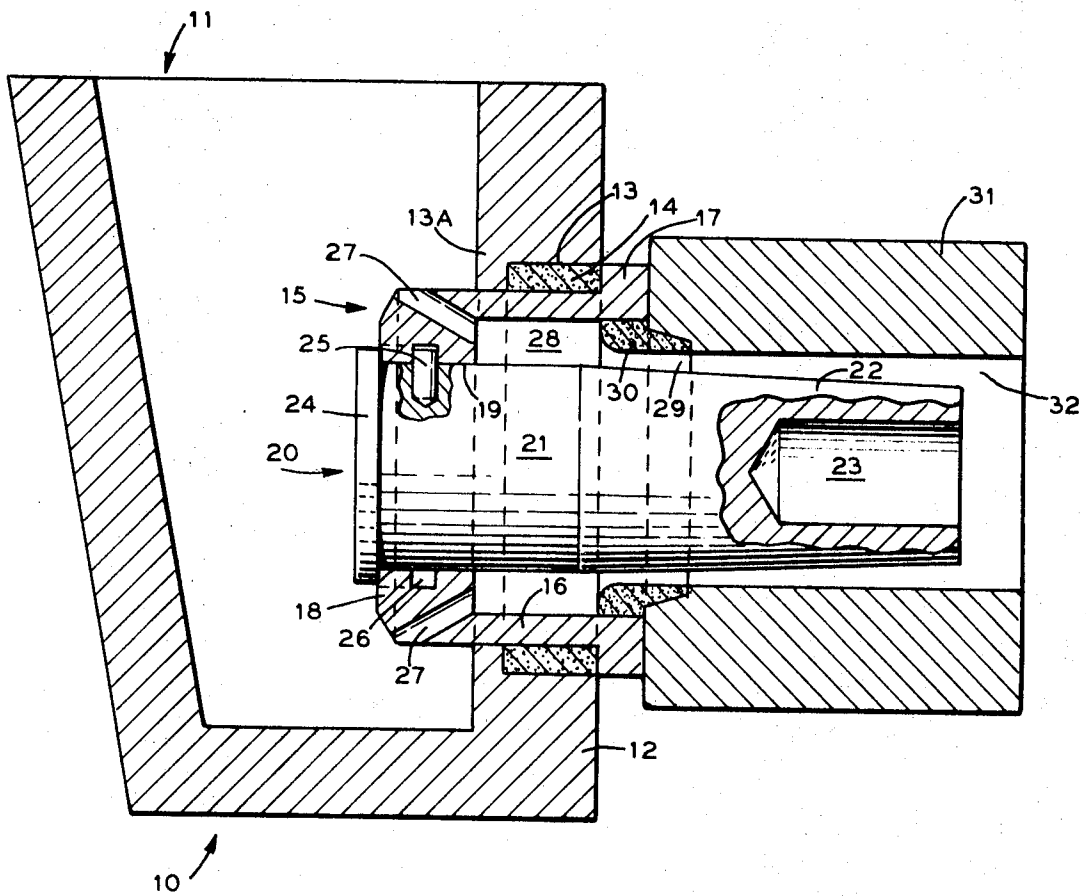
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[54] **MANDREL HOLDER FOR HORIZONTAL PIPE**
CASTING APPARATUS
7 Claims, 1 Drawing Fig.

[52] U.S. Cl..... **164/281,**
65/187, 164/85, 164/135, 264/216
 [51] Int. Cl..... **B22d 11/10**
 [50] Field of Search..... **164/82, 85,**
133, 135, 273, 281; 65/187; 264/216, 209

ABSTRACT: A holder for a mandrel mounted in a metal casting crucible to continuously form pipe; the casting operation being of the horizontal type and the holder accurately centering the mandrel in respect to the tube mold.





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MANDREL HOLDER FOR HORIZONTAL PIPE CASTING APPARATUS

BACKGROUND OF THE INVENTION

Known horizontal pipe casting installations include a pouring funnel or crucible for receiving molten metal and at the bottom thereof has an opening communicating with the usual, horizontally extending tube mold. The mandrel associated with such tube mold must be suitably mounted and centered.

In one case, the opposed vertical wall portions of the crucible are formed with aligned openings to receive opposite end portions of the mandrel. The forward end of the mandrel projecting into the tube mold, is in cantilevered relation thereto, since the rear end of the mandrel is fixed in one wall opening while the other wall opening provides an annular clearance for passing the molten metal therethrough. This type of casting apparatus presents problems in precision centering of the mandrel in respect to the tube mold.

Another horizontal pipe casting installation, the mandrel is mounted in a single outlet opening in the crucible wall. While this arrangement improves the centering of the mandrel; the mandrel mounting means necessarily subdivides the outlet opening through which the molten metal moves and adversely affects the cooling operation by reason of irregularities in the metal flow.

Accordingly, an object of this invention is to provide an improved mandrel holder which is to be mounted in the single outlet opening of a crucible; the holder being of a structure and disposition relative to the crucible to insure uniform flow of molten metal toward the tube mold at uniform temperature.

Another object of this invention is to provide a mandrel holder of the character described, which comprises a cup-shaped member which projects into the interior of the crucible; the bottom wall of the member having an opening for receiving the rear end of the mandrel so as to accurately center the same in respect to the tube mold extending from the outlet opening of the crucible.

A further object of this invention is to provide a mandrel holder of the character described; wherein the holder has passages for passing the molten metal, which are so located and positioned to provide optimum thermal transfer conditions for the molten metal, and minimal temperature drops at the tube or pipe forming position.

Yet another object of this invention is to provide an improved mandrel holder of the character described, which lends itself to economical production procedures and close tolerances to insure precision fitting relative to the crucible.

Still a further object of this invention is to provide an improved mandrel holder of the character described, which includes improved means for rapidly assembling the holder with the crucible in tightly fitting relation to each other and in precise coaxial alignment.

Yet a further object of this invention is to provide an improved mandrel holder of the character described which may be used with mandrels formed of material having poor heat conducting properties, such as ceramics or the like; or mandrels having a tapering cross section at the forward end thereof with an axial bore, to thereby increase heat resistance in the axial direction.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a longitudinal side elevational view in section, showing a mandrel holder embodying the invention, in association with a crucible, mandrel and tube mold.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the FIGURE, a pipe casting apparatus of the horizontally type, is generally indicated at 10. The same includes a crucible 11 for receiving the molten metal which is to be continuously cast into pipe. The crucible 11 comprises a forward sidewall portion 12 which is formed at its lower end

with an outlet opening 13, with an annular shoulder portion 13A on the inner side thereof. An annular sealing ring 14 of graphite or the like, is fixed in outlet opening 13.

The novel mandrel holder of the instant invention is generally indicated at 15 and is of cup shape. The holder 15 comprises a sidewall portion 16 with an outwardly extending radial flange 17 at the outer end thereof and a thickened bottom wall 18. The bottom wall 18 is formed with an opening 19 to mount therein the rear end portion of a mandrel member generally indicated at 20.

The mandrel 20 includes a rear portion 21 of uniform diameter and a forwardly extending portion 22 of tapering cross section; said mandrel portion 22 being formed with an enlarged axial recess 23. The rear portion 21 of member 20 includes a flange 24 for abutting the marginal wall portion of holder 15 at opening 19 thereof when said mandrel 20 is assembled with holder 15.

The mandrel 20 is locked to holder 15 by way of radial pins 25 receivable in bayonet slots 26 formed in bottom wall 18 of holder 15. This makes for rapid assembly of mandrel 20 with holder 15 and precise coaxial relation therebetween.

The bottom wall 18 of holder 15 is formed at its juncture with sidewall 16, with a series of passages 27 to allow passage of molten metal in crucible 11 to the enlarged annular space 28 between holder wall 16 and mandrel portion 21. The molten metal then flows to an annular passage 29 of reduced cross section located between mandrel portion 22 and an annular graphite member 30 and thence to an annular passage 32 between the usual tube mold 31 and the end portion of mandrel portion 22.

Thus, the metal is converted to pipe form with a uniformity of temperature in the annular passages 28, 29 and 32, as well as the interior of crucible 11; since the mandrel 20 and holder 15 project into the interior of said crucible.

The distribution of passages 27 in holder 15 is such as to equalize the rates of metal flow into passage 28 despite variations in pressure within crucible 11. Thus, mandrel 20 will assume relatively high melt temperatures by way of holder 15. Further, mandrel 20 has a relatively low heat transfer by reason of the recess 23; or alternatively, the mandrel is formed of a low heat conductive material such as ceramics or the like.

It is understood that the usual iron tube mold 31 is held in place against sleeve 30 and holder flange 17 by long bolts, not shown, engaging the crucible 11, to thereby properly center mold 31 in respect to the longitudinal axis of mandrel 20.

I claim:

1. In continuous horizontal pipe casting means, a crucible for holding molten metal and having an outlet in a sidewall portion thereof, a tube mold extending horizontally from said outlet, and a mandrel extending within said mold; the improvement comprising a mandrel holder for maintaining said mandrel in coaxial relation to said mold, said holder being mounted in said outlet and comprising a cup-shaped member having a cylindrical sidewall and a bottom wall, said bottom wall being disposed interiorly of said crucible and formed with an opening, said mandrel having a rear portion mounted in the opening in said bottom wall of the holder, and passages in wall portions of said holder for connecting the interior of said crucible with the annular space between said mandrel and said tube mold.

2. In pipe casting means as in claim 1 wherein said passages are located at the juncture of the sidewall and bottom wall of said holder.

3. In a pipe casting means as in claim 2 wherein said passages are nonuniformly distributed about the periphery of the bottom wall of said holder.

4. In a pipe casting means as in claim 1 and further including coacting means for locking said mandrel to said holder.

5. In a pipe casting means as in claim 1 wherein the outer end mandrel portion is of tapering cross section, said mandrel end portion having an axial recess therein.

6. In a pipe casting means as in claim 1 wherein said mandrel is formed of ceramic material.

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7. In a pipe casting means as in claim 1 wherein said mandrel comprises one end portion of uniform cross section and another end portion of tapering cross section, said one end portion having a flange at the outer end thereof, the one end

portion of the mandrel being disposed in the bottom wall opening of said holder with the mandrel flange abutting marginal outer surface portions of the bottom wall of said holder at the opening therein.

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