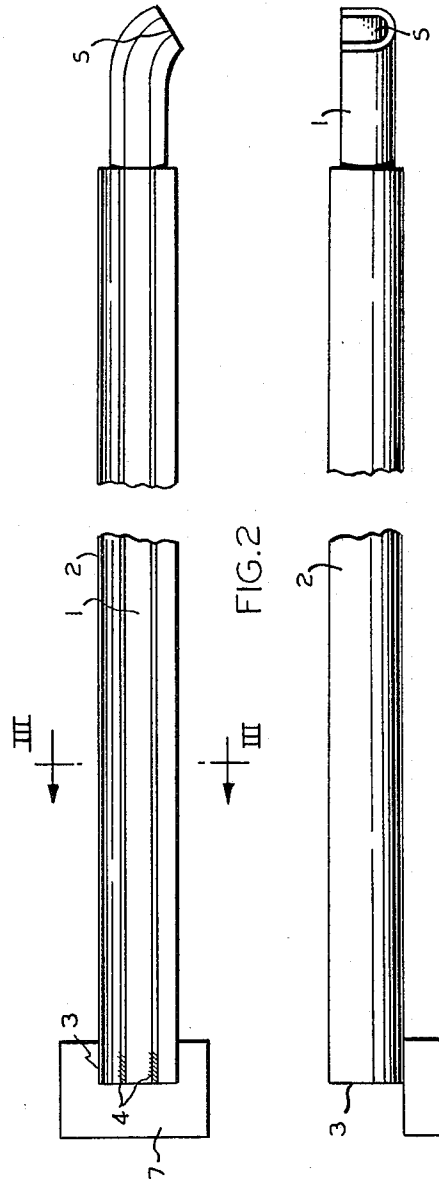
Nov. 15, 1966 S. GURAK 3,284,860

POURING TROUGH FOR CENTRIFUGAL CASTING MACHINE

Filed Jan. 29, 1964



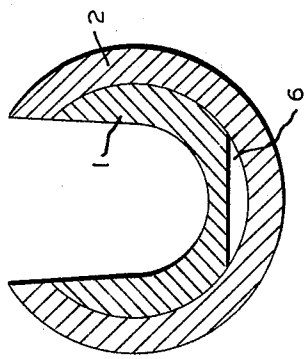


FIG.3

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POURING TROUGH FOR CENTRIFUGAL CASTING MACHINE

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The present invention relates to pouring troughs for use with centrifugal casting machines.

In the manufacture of cast iron pipe the pipe is centrifugally cast in a substantially horizontal mold which is rotated about its longitudinal axis. The molten metal is delivered to the inside of the mold by means of a pouring trough which extends for substantially the full length of the mold, and the metal is distributed along the length of the rotating mold as it discharges from the end of the trough by relative longitudinal movement between the mold and trough.

When molten metal is poured in the trough, the inside of the trough attains a much higher temperature than the outside of the trough. Also the bottom portion of the trough which conveys the iron attains a much higher temperature than the top portion of the trough. This uneven heating of the trough causes it to warp and bow with the result that it cannot be maintained in proper alignment with the mold and the molten metal does not flow down the trough in the proper manner.

To overcome the difficulties inherent in the unequal expansion due to the temperature gradient between the inside and outside surfaces of the trough and the bottom portion and the top portion it has been the practice to use a continuous outer steel shell lined with longitudinally short segments of a more refractory material. When these segments are properly mounted in the trough they prevent excessive warping and bowing of the trough. Maintenance costs on such troughs are high, they do not present a continuous smooth surface for the metal to flow down, and they are not suitable for use in operations wherein the trough is overturned after each pipe is cast in order to dump out the iron splinter left in the trough.

In recent years the use of single-piece troughs has increased. However, despite the use of special cross-sectional designs and support means the warpage and bowing of the trough is still a major problem which has not heretofore been satisfactorily eliminated from the casting operation.

The invention has for its object the provision of an improved trough which does not distort due to heat, which presents a continuous uninterrupted surface down which the molted metal flows and which may be overturned to dump out iron splinters.

Other objects of the invention will be apparent from the description and drawings.

In the drawings:

FIGURE 1 is a side elevation view of the trough of the present invention.

FIGURE 2 is a top elevation view of the trough of FIGURE 1.

FIGURE 3 is a transverse section of the trough of FIGURES 1 and 2.

The trough of the invention illustrated in FIGURES 1–3 is suitable for use in any retractive casting operation wherein a pouring trough is used. Such troughs are supported at one end in cantilever fashion and this supported end is mounted adjacent the pouring ladle of a casting machine so that molten metal may be poured from the ladle into the trough. The opposite end of the trough is unsupported and is arranged to enter and traverse a spinning mold when there is relative longitudinal movement between the trough and mold so that

molten metal pouring from the unsupported end of the trough is distributed along the length of the mold. The relative longitudinal movement between the trough and mold may be accomplished by mounting the mold so that it may be moved longitudinally and/or by mounting the trough and pouring ladle so that they may be moved along the longitudinal axis of the mold. Since the instant invention relates solely to the construction of the pouring trough and the details of the casting method and apparatus set forth above are well known, the casting machine is not illustrated. It is sufficient to point out that the supported end **3** of the illustrated trough is mounted in cantilever fashion on a support **7** which is adjacent the pouring ladle of a casting machine, and that unsupported end **5** of the illustrated trough is mounted so that it may enter and traverse a spinning mold when there is relative longitudinal movement between them.

The trough of the present invention, as illustrated in FIGURES 1–3, comprises an inner channel **1** mounted in a support channel **2**. These two channels are secured togethed adjacent the support end **3** of the trough by means of tack welds **4**. The discharge end **5** of the inner channel **1** extends beyond the support channel **2** for a short distance and is appropriately shaped to give the desired angle of impingement of molten metal pouring from the trough onto the surface of a spinning mold.

Referring specifically to FIGURE 3, the inner channel is seen to have a substantially circular outer surface and an inner surface defined by a substantially semicircular bottom and two slightly divergent sides extending upwardly tangentially, from the curved bottom. The outer surface of the inner channel being greater than a semicircle, the width of the inner channel at the top is less than its width at the horizontal diameter. The support channel is defined by an inner circular surface of substantially the same diameter as the outer surface of the inner channel and an outer co-axial circular surface. The support channel encircles the inner channel, and since both its inner and outer surfaces are greater than a semicircle, the opening at the top of the support channel is less than either the diameter of its inside surface or the diameter of the outside surface of the inner channel. Thus the inner channel cannot be removed from the support channel through its longitudinal opening or mouth. This permits the trough to be turned over to dump the iron splinter which remains after every casting cycle, there being no danger whatsoever that the inner trough will be dumped from the support trough.

The clearance between the inner and support channels is such as to permit free longitudinal expansion of the inner channel within the support channel but is small enough to prevent any appreciable vertical or transverse movement of the inner channel within the support channel. In other words, the inner channel is securely held against any movement except longitudinal expansion, and as a result it will remain as straight as the support channel. Since the support channel does not come in contact with the molten metal it will not be subject to any appreciable extent to the thermal expansion forces which will tend to bow and warp the inner channel.

Preferably an air space **6** is provided between the bottom of the inner channel and the inside opposite surface of the support channel. Since the bottom of the inner channel is subject to the greatest concentration of heat and since there is not any balancing expanding mass at the end of the diameter opposite the bottom of the channel, the open top, there is a great tendency for it to bow in the vertical plane. The air space **6** is provided to limit the heating up of the bottom section of the supporting channel. This reduces the expansion forces which would tend to cause the support channel to bow in the vertical

plane and make it ineffective in preventing bowing of the inner channel. On the other hand, heat transfer to the side sections of both the inner channel and the supporting channel will be substantially equal so that there will be a balancing force on each side of the trough axis which counteracts the bowing tendency in the horizontal plane caused by the expansion of the opposite side of the trough. If it is desired to provide the trough with spray equipment a spray nozzle mounted adjacent the discharge end of the trough can be fed by means of lines positioned in the cavity formed by air space **6**.

The preferred method of manufacturing the trough of the present invention is to slide one tube which is to be the inner channel into a second tube which is to be the support channel. The resulting concentric tube construction then serves as a blank from which the trough is manufactured. The trough is formed by milling a longitudinal section from the blank to provide the desired inside configuration. This permits the use of standard steel tubing which requires little, if any, machining to form the starting blank, and the final trough configuration can be accomplished by a simple machining operation. Since both the inner trough and support trough are machined at the same time the longitudinal opening in each channel is accurately aligned with that in the other channel. If air gap **6** is to be left between the bottom of the inner trough and the support trough, the inner tube is cut to the proper shape before it is inserted into the outer tube.

To make a trough suitable for a 6" cast iron pipe casting machine a 4½" O.D. outer tube having a ½" thick wall was bored out to provide a .045" clearance between it and an inner tube having a 3½" O.D. and a ⅝" wall thickness. Before the inner tube was inserted in the outer tube, a flat cut was made on the bottom side of the inner tube leaving a metal thickness of ¼" at the thinnest spot. The assembly of the inner tube and outer tube was formed into a trough by milling a longitudinal opening through both the inner and outer tube. The two tubes were then tack welded together at the mounted end of the trough and the spout end was formed to the proper shape.

The foregoing description and the accompanying drawings are merely explanatory and illustrative of a presently preferred embodiment of the invention and are not to be construed as limiting. Various changes, which will now suggest themselves to those skilled in the art, may be made in the structural details of the trough members. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

I claim:

1. A pouring trough for a centrifugal pipe casting machine comprising an elongated outer channel having a longitudinal opening and an inner surface which is greater than a semicircle in transverse cross-section, and an elongated inner channel having a longitudinal opening and an outer surface which is greater than a semicircle in traverse cross-section, the inner channel being telescoped within the outer channel with its longitudinal opening aligned with the longitudinal opening in the outer channel, a sliding clearance being provided between the outer surface of the inner channel and the inner surface of the outer channel, whereby each channel is permitted to expand longitudinally independently of the other, the two channels being welded together adjacent one end thereof, and at the end opposite the welded connection, the inner channel extends beyond the outer channel and the extended portion is shaped to give the desired spout configuration.

2. A pouring trough according to claim **1** wherein an insulating air space is provided between the inner and outer channels diametrically opposite the aligned longitudinal openings.

References Cited by the Examiner

UNITED STATES PATENTS

1,465,153	8/1923	Allard	22—65
1,517,608	12/1924	Atkins	22—65
1,584,840	5/1926	Cammen	22—65
1,736,424	11/1929	Bell	22—65
1,849,072	3/1932	Clark	22—65
1,881,228	10/1932	Pape	22—65
2,066,229	12/1936	Ridley et al.	22—65
2,073,200	3/1937	Dumas	22—65
2,853,755	9/1958	Beyer	22—200.5
3,004,314	10/1961	Beyer	22—200.5

FOREIGN PATENTS

212,931	7/1924	Great Britain.

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