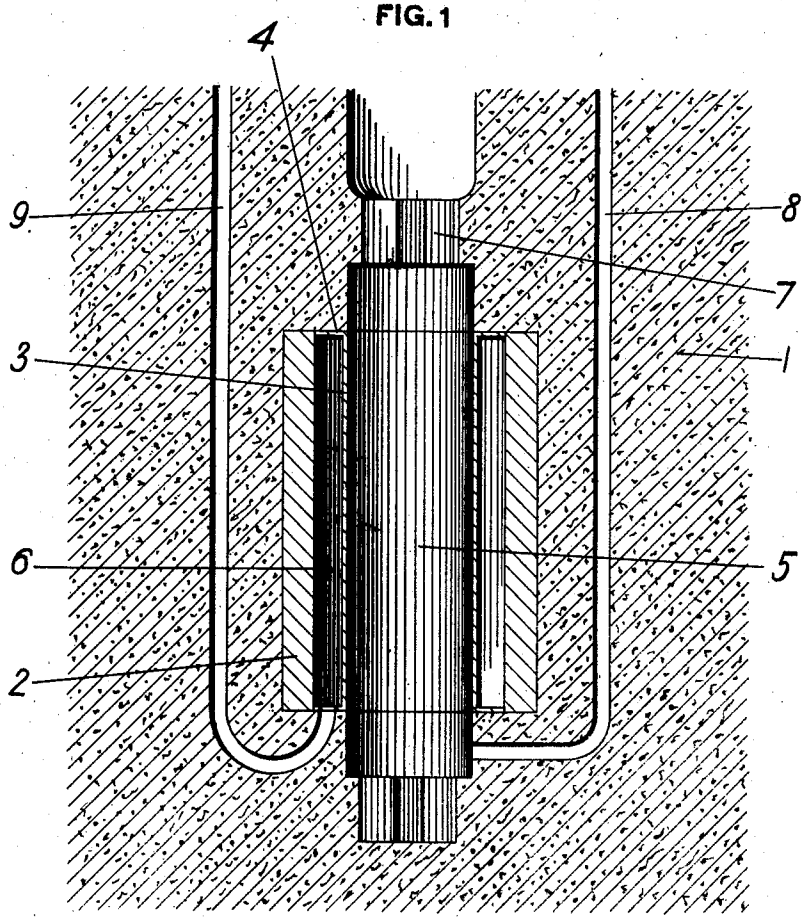
J. B. HENRY.

METHOD OF CASTING CHILLED ROLLS.

APPLICATION FILED JULY 12, 1909. RENEWED NOV. 10, 1911.

1,011,430. Patented Dec. 12, 1911.

FIG. 1



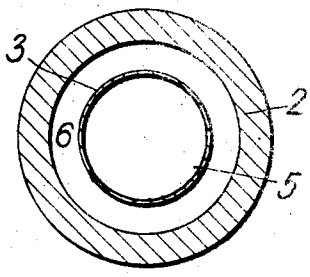


FIG. 2

WITNESSES

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METHOD OF CASTING CHILLED ROLLS.

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To all whom it may concern:

Be it known that I, JOHN B. HENRY, a resident of Aspinwall, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Casting Chilled Rolls, of which the following is a specification.

This invention relates to a method of casting hard rolls for rolling iron, steel or other metals, such as chilled iron rolls or high carbon steel rolls.

The object of the invention is to provide a method for making rolls of this character whereby breakage thereof is largely overcome.

Rolls for rolling iron, steel or other metals frequently break in service due to the fact that in order to get the hard working surface desired on the rolls, it is necessary to cast them of a brittle metal, such as chilled iron or high carbon steel. These brittle rolls under the severe strain of usage very frequently break. Attempts have been made to overcome this by forming the center and necks of the roll of a steel shaft and casting the body of chilled iron or high carbon steel thereon. This, however, has not been successful due to the strains induced in the body of the roll shrinking on the rigid center. I overcome the difficulties stated by forming the center and outer portion of the rolls of different characters of metal, forming said parts by casting, and casting the two parts either simultaneously or in such close succession that the second part is poured before the first becomes rigid, thereby producing a thorough and intimate union of the parts and enabling the two parts to cool and shrink uniformly and thus not induce internal strains.

In the accompanying drawing, Figure 1 is a vertical section through a mold, illustrating my method of casting a roll, and Fig. 2 is a horizontal section therethrough.

In the drawing, the mold is shown at 1, this preferably being a sand mold as is the usual practice. This mold has formed in it a cavity of the shape and size of the roll which it is desired to cast, and in case the roll is to have its outer portion formed of chilled iron, there will be placed in the mold the usual chill 2. The mold is divided by means of a suitable fusible partition, shown in the form of a metallic shell or sleeve 3 provided with end flanges 4 and which divides the mold cavity into a central compartment 5 and an outer annular compartment 6. The central compartment 5 includes the portion to form the necks 7 of the roll, and is shown of substantially the same diameter as the necks although this is not necessary as it may be of greater or lesser diameter than said necks. The shell 3 may be formed of any suitable metal which will fuse completely or partly when the molten metal is poured into the same. A gate or runner 8 leads to the central compartment 5 and another gate or runner 9 leads to the outer or annular compartment 6.

The shell 3 divides the mold cavity completely into two compartments and serves to keep the metals forming the two parts of the roll separate from each other. The metal for the two compartments may be poured simultaneously or that for the center may be poured first followed by that forming the outer or body portion, or vice versa. In case the metals of the two parts of the roll are poured successively, the metal poured last will be poured before the first poured is rigid or has thoroughly set, so that the two parts become completely united by the fusing of the shell 3 and cool together and shrink uniformly, thus preventing the setting up of internal strains. This process enables the roll center and the outer or working face of the roll to be cast of metals of different characters or having different analysis, enabling the two parts to be formed of metal having special qualities particularly adapting the same to give the maximum strength or wearing qualities for that part of the roll. For instance, the central part may be of a low carbon steel to give very great strength, while the outer or annular portion may be of high carbon steel or chilled iron. Consequently, the roll will have the maximum strength without in any way impairing the hardness and wearing quality of its working face. I do not, however, limit the process to casting the central part of steel and the outer part of high carbon steel or chilled iron, as each part of the roll may be formed of any desired metal or of the same metal but having a different analysis. The shell 3 may be made either of cast or pressed metal of the same or different character from either or both of the parts of the roll. It is of such thickness that it prevents the metal poured into one part of the mold from entering the other part of the mold, and at the same time will

practically fuse and become an integral part of the completed roll casting. After casting, both parts of the roll cool at the same time and shrink uniformly so that the strains that are produced in case either part of the roll were solid and set when the other part is cast, are almost entirely overcome. The resultant roll is, to all intents and purposes, an integral roll being composed of two different kinds or grades of metal thoroughly united and having maximum strength and wearing qualities.

What I claim is,

1. The method of casting rolls having the central portion composed of a strong tough metal and the outer surface of a hard brittle metal, consisting in separately casting the central and surface portions of the roll, one of said portions being poured first and the other being poured before the first is set or becomes solid.

2. The method of casting rolls having the central and outer portions composed of different kinds or grades of metal, consisting in first pouring the central portion thereof of a strong tough metal, and before the same is set and become rigid, pouring the outer portion of a hard brittle metal and thereby causing the two parts to unite and cool and shrink simultaneously.

3. The method of casting rolls having the central and outer parts composed of different kinds or grades of metal, consisting in completely dividing the mold by means of a fusible partition, first pouring into the central compartment a strong tough metal and into the outer compartment a hard brittle metal, said metals being separately poured into the two compartments and causing the molten metal to fuse the partition and thereby cause the two metals to firmly unite.

4. The method of casting rolls having the central and outer portions thereof composed of metals of different grades or kinds, consisting in dividing the mold by means of a thin metal partition, first pouring a strong tough metal into the central compartment and then pouring a hard brittle metal into the outer compartment, the pouring of one of said metals being effected while the other metal is still at a high temperature.

5. The method of casting rolls having the central and outer portions thereof composed of metals of different grades or kinds, consisting in forming a mold with the mold cavity arranged vertically, dividing the same by means of a thin fusible partition into an inner central compartment and an outer annular compartment, pouring into the central compartment a strong tough metal and into the outer compartment a hard brittle metal, said metals being separately poured into the two compartments from below in such time sequence that the one is not set or rigid when the other is poured, said metals acting to fuse the partition and thereby cause the two metals to firmly unite.

6. The method of casting rolls having the central and outer portions thereof composed of metals of different grades or kinds, consisting in forming a mold with the axis of the mold cavity vertical, placing in said mold a metal chill, dividing said mold by a thin metal partition into a central compartment and an outer annular compartment, pouring into the central compartment a strong tough metal and into the outer compartment a hard brittle metal, said metals being poured separately into the two compartments and entering through the bottom in such time sequence that the one is not set or rigid when the other is poured, said metals serving to fuse the partition and thereby cause the two metals to firmly unite.

In testimony whereof, I have hereunto set my hand.

JOHN B. HENRY.

Witnesses:

F. L. Berversdorf,

Jas. L. Weldon.