No. 635,255. Patented Oct. 17, 1899.

E. E. KAYE.

METHOD OF AND MOLD FOR CASTING CHILLED ROLLS.

(Application filed July 1, 1898.)

(No Model.)

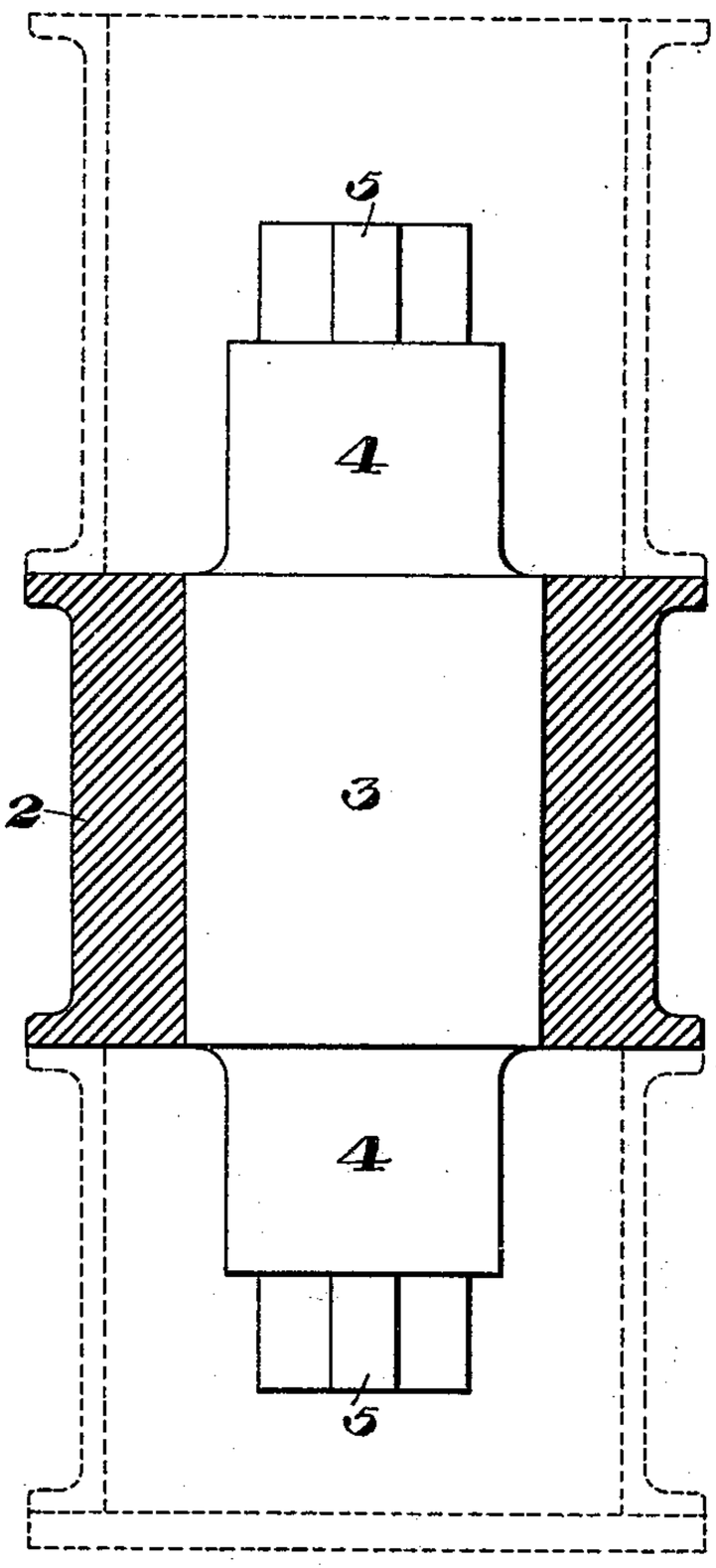

Fig. 1.

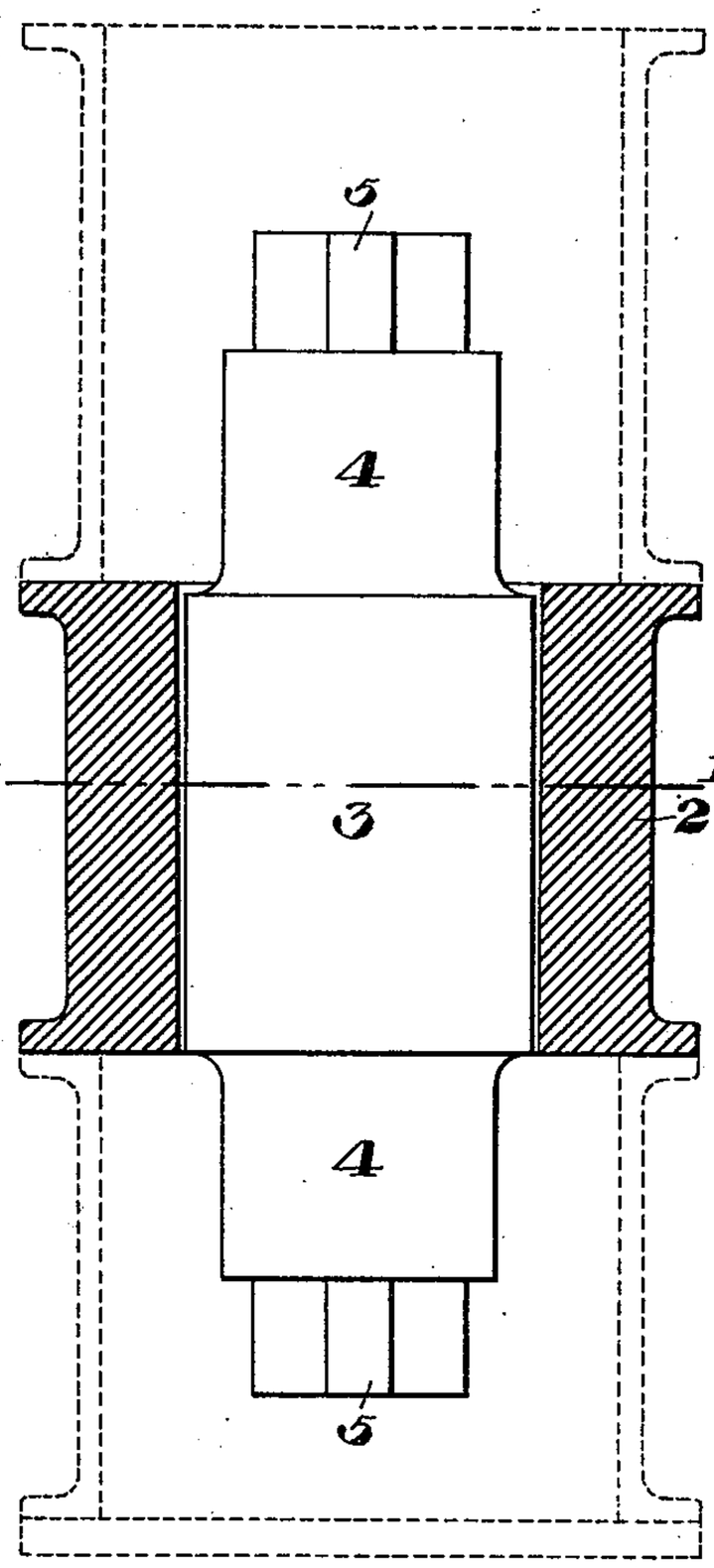

Fig. 2.

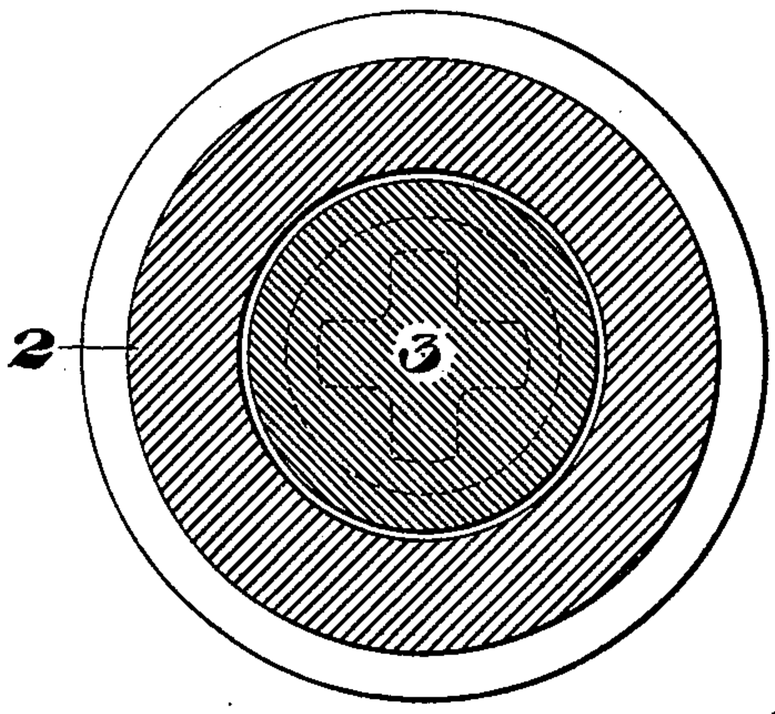

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

ELLSWORTH E. KAYE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE ROBINSON-REA MANUFACTURING COMPANY, OF SAME PLACE.

METHOD OF AND MOLD FOR CASTING CHILLED ROLLS.

SPECIFICATION forming part of Letters Patent No. 635,255, dated October 17, 1899.

Application filed July 1, 1898. Serial No. 684,966. (No model.)

To all whom it may concern:

Be it known that I, ELLSWORTH E. KAYE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Chilled Rolls and Chill-Molds Therefor, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of my improved chill, showing the roll therein before cooling. Fig. 2 is the same view showing the roll after cooling, and Fig. 3 is a cross-section on line III III of Fig. 2.

My invention relates to the casting of chilled rolls of plain cylindrical shape and is designed to provide means for producing a chill of an even and uniform depth and also to counteract the effect of shrinkage in casting in the roll during cooling; and it consists, broadly, in a chill-mold whose inner surface is slightly tapered downwardly, the amount of said taper being determined by the size and shape of the desired roll and the character of the metal used.

The difficulties attendant upon the use of the heretofore-known cylindrical chill-molds have been, first, to obtain a uniform depth of chill, since the metal in cooling contracts and parts of the surface of the roll will cease to be in contact with the chill-mold, thus causing the action of the chill-mold to cease at such portions of the surface of the roll, and, second, the shrinkage of the roll being greater at the top than at the bottom of the chill-mold it has been necessary after removal from the chill-mold to turn down the lower portion of the surface of the roll upon the lathe, thus entailing an increase in the cost of production and causing a further difference in the depth of the chill. By the use of my invention I entirely overcome these difficulties and am enabled to produce rolls of perfectly cylindrical form and even depth of chill without further manipulation after removal from the mold.

In the drawings, 2 is my improved chill-mold having roll 3 therein, and I show by dotted lines the cope and drag, which may be of any desired character, since they do not form a feature of my invention.

4 4 are the journals, and 5 5 the coupling ends, of the roll.

The roll shown in the drawings is what is known as a "tin-plate" roll and is of a class of rolls which I deem most suitable to illustrate my invention. It is designed to represent what is technically known to the trade as a "twenty-four-inch" roll—that is to say, a roll that when mounted and in working position will measure twenty-four inches in diameter and thirty-two inches in length, exclusive of the journals and couplings. I will now proceed to describe my mode of procedure in preparing my chill-mold for casting a roll of this size, premising that in casting rolls of other sizes the figures I hereinafter give will be changed relatively to each other and to the sizes of the rolls.

As is well known, after a roll has been received at the mill and before it is put into actual use it undergoes what is known as "dressing," in which operation a small portion of its surface is turned off. To allow for this, I aim to produce a roll that when the chill-mold is removed therefrom will be about twenty-four and seven-sixteenths inches in diameter. Having discovered by experiment that while the diameter of the bottom end of a roll of this size in cooling will be reduced about seven-sixteenths of an inch by reason of the shrinkage of the metal, the diameter of the upper end thereof will be reduced about three-fourths of an inch. I therefore construct my chill-mold with an internal diameter of about twenty-five and three-sixteenths inches at the upper end thereof and an internal diameter of about twenty-four and seven-eighths inches at its lower end, so that the chill-mold cavity shall be that of an inverted frustum of a cone. As to the height of said chill-mold cavity I have found that a roll of thirty-two inches in length will shrink about one-fourth of an inch in length, and I therefore give my chill-mold cavity a height of about thirty-two and three-fourths inches to allow both for the said shrinkage and the subsequent dressing at the mill.

In casting a roll with my improved chill-

mold I proceed in the usual manner. Suitable cope and drag containing the sand for forming the journals and couplings and a suitable flask for pouring are provided.

I show in Fig. 1 the position of the molten metal in contact with the mold and in Fig. 2 the formed roll after shrinkage of the metal has ceased. It will be apparent that by reason of the taper in the sides of the chill-mold cavity the metal while cooling will be supported centrally in said chill-mold, thus permitting its efficient action throughout the entire operation.

When the roll is cool, I lift the chill-mold from the roll by any suitable means, and the roll is then ready for shipment.

The advantages to be derived from the use of my invention will be apparent to those familar with the art of casting chilled rolls, since I am able to obtain a roll having a chilled surface of uniform depth and having a uniform diameter. I do not have to further manipulate the roll after removing the chill, but am able to immediately ship the same, thus affording a reduction in the cost of manufacture. The construction of the chill-mold itself involves but little cost either in material or labor, thus effecting a further saving.

It will be readily understood that various changes within the scope of the claims may be made in the construction and application of my chill-mold without departure therefrom, since I do not limit myself to the particular application as herein described. Other classes and sizes of rolls may be cast with modifications in the chill-mold and changes may be made in the other parts of the mold without departure from my invention, since

What I claim is—

1. Apparatus for casting substantially cylindrical rolls with a practically uniform depth of chill consisting of a chill-mold the surface of whose matrix-cavity is substantially that of a frustum of a cone substantially as described.

2. The method of making substantially cylindrical rolls, consisting in casting the metal in a chill-mold having a frusto-conical matrix-cavity, with its larger end upward, and cooling the outer portion of the cast roll in contact with said mold in such a way as to cause the larger end of the roll to contract to substantially the same final diameter as that of the smaller end; substantially as described.

In testimony whereof I have hereunto set my hand.

ELLSWORTH E. KAYE.

Witnesses:
M. S. MURPHY,
GEORGE I. HOLDSHIP.