

S. McMILLEN.
MANUFACTURE OF ROLLS, &c.
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1,241,867.

Patented Oct. 2, 1917.

FIG. 1.

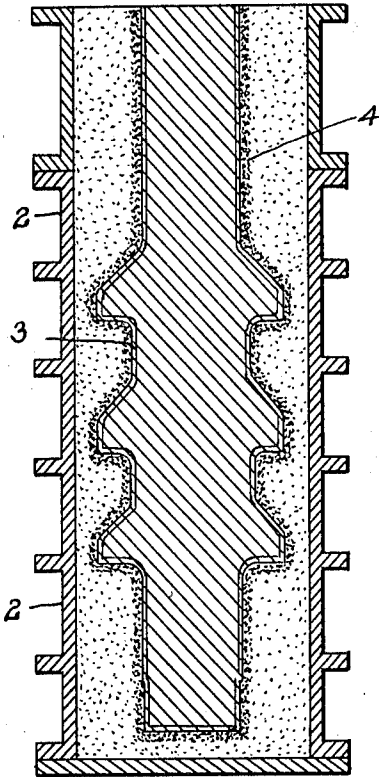


FIG. 2.

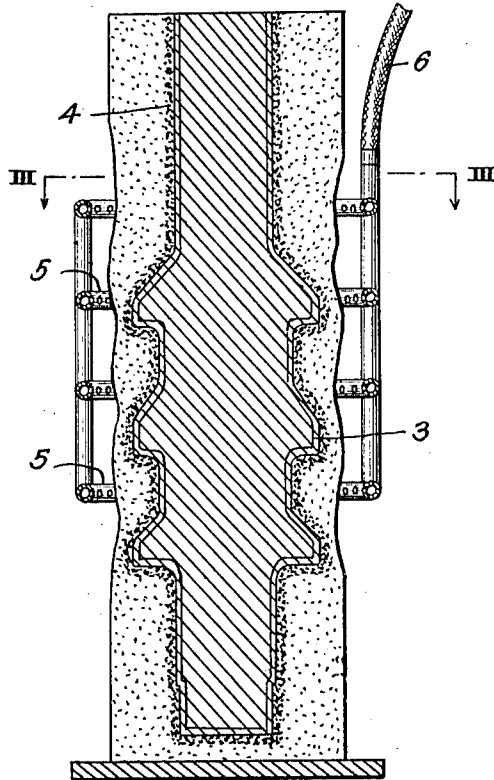
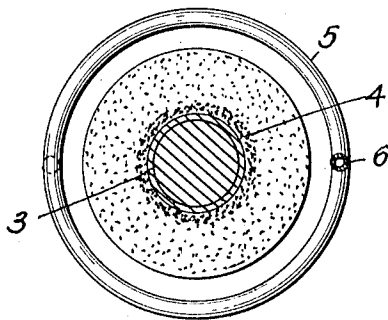


FIG. 3.



WITNESSES

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MANUFACTURE OF ROLLS, &c.

1,241,867.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL McMILLEN, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in the Manufacture of Rolls, &c., of which improvements the following is a specification.

10 The invention described herein has for its object the production of tough, hard and dense but unchilled surface in steel rolls and other articles which, in use, are subject to abrasion and great transverse strains.

15 To this end it is desirable to prevent a segregation of the carbon and other ingredients in the metal, at and adjacent to the surface of the roll which in use is subject to abrasion. While in a molten condition, the segregation will occur and hence it is desirable to promote solidification of the metal at and adjacent to the surface of the roll or other article, and to overcome the tendency to brittleness incident to the rapid cooling of the steel.

The object of the invention described herein is to provide for the rapid cooling of the metal adjacent to the surface of the roll, thereby preventing segregation, and to provide for a self-annealing of the hardened metal, thereby overcoming any weakness under transverse strains due to the rapid cooling. The invention is hereinafter more fully described and claimed.

35 In the accompanying drawings forming a part of this specification, Figure 1 is a sectional elevation of a mold for forming rolls which is shown in position therein: Fig. 2 is a view similar to Fig. 1, showing the mold flask removed and the outer portion of the stripped mold subjected to sprays of water, and Fig. 3 is a sectional plane view, the plane of section being indicated by the line III—III Fig. 2.

45 In the practice of the invention, the mold is formed of the usual material, *i. e.* sand having a suitable proportion of loam mixed therewith in a suitable flask 2. After the metal has been teemed into the mold, the latter and contained metal are allowed to stand until the shell or skin 3, which begins to form as soon as the metal contacts with the surface of the mold, has attained such a thickness and rigidity that there will be no tendency to deformation on the removal of

the flask. As the heat of the metal will bake the molding material into hardened shell 4 of considerable thickness, capable of preventing, in part at least, any tendency to deformation, the flask can be stripped 60 earlier than would be possible, were it necessary to depend alone on the skin of solidified metal to prevent deformation.

As soon as the flask has been removed, jets of water are caused to impinge on the surface of the mold. The jets should have sufficient force to have a wasting action thereby removing in time practically all of the mold material except the hard baked jacket, enveloping the roll. A convenient means for 70 applying jets of water consists of a series of rings 5 of pipe and having their inner walls suitably perforated and placed around the stripped mold, as shown in Fig. 2. These rings having a flexible connection 6 to a 75 suitable source of liquid under pressure. By the action of these jets, the mold material is not only cooled, but this material, which is a non-conductor, is rapidly washed away, thereby permitting of a more rapid radiation of heat and consequently a more rapid solidification of the metal inwardly. This cooling operation is continuous, until the metal has solidified to a sufficient depth. It has been found in practice that the metal will 85 be solidified to a sufficient depth by allowing the jets to play on the shell or jacket 4 for an hour for each two inches of the diameter of the roll. As for example, if the roll is thirty inches in diameter, the cooling 90 operation should be continued for about fifteen hours.

The cooling action in any case is discontinued before the metal in the interior of the roll is in a solid condition. It has been 95 found that as the shell or jacket of baked sand, which is not materially reduced by the action of the jets of water, and is a poor conductor of heat, will prevent or at least greatly reduce a loss of heat by radiation, 100 and that the heat from the molten interior of the roll, will raise the temperature of the solidified shell to a sufficient degree to remove the brittleness resulting from the rapid cooling by the jets of water.

I claim herein as my invention:

1. As an improvement in the art of making rolls, etc., the method herein described, which consists in forming a mold of finely divided material as sand within a flask, 110

pouring the metal into the mold, removing the flask from the mold and saturating the molding material with a cooling fluid.

2. As an improvement in the art of making rolls, etc., the method herein described, which consists in forming a mold of finely divided material as sand within a flask, pouring the metal into said mold saturating the molding material with a cooling fluid, removing the flask from the mold, and gradually removing the outer portions of the mold to facilitate the cooling of the metal.

3. The method herein described, which

consists in forming a mold of finely divided material as sand, in a flask, pouring the metal into the mold, removing the flask from the mold, simultaneously saturating the material of the mold with water, and progressively removing such material and discontinuing such cooling operation when the interior portions of the article are in a molten condition.

In testimony whereof, I have hereunto set my hand.

SAMUEL McMILLEN.

Witness:

ALICE A. TRILL.

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