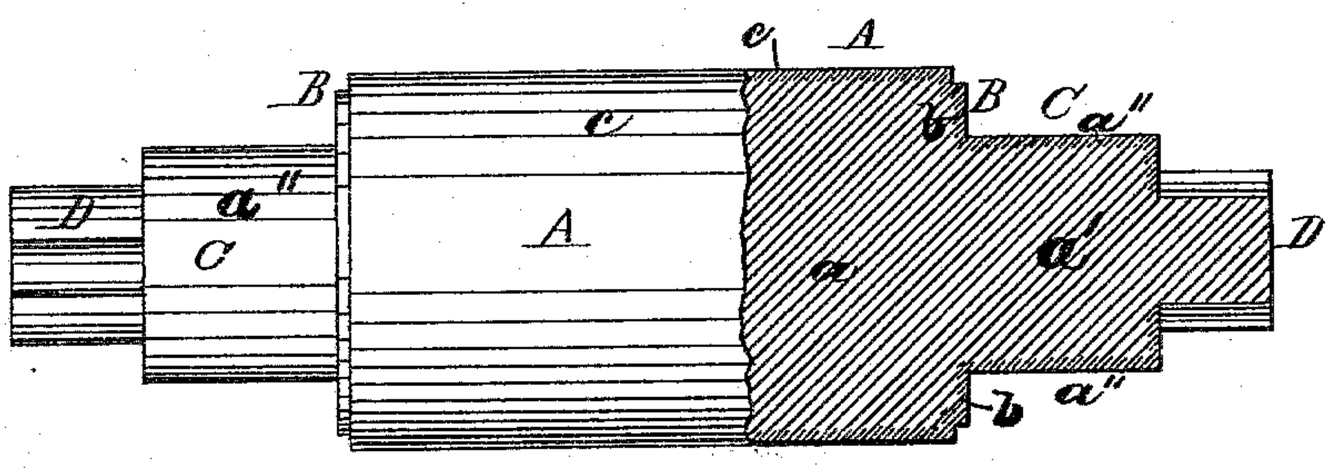
(No Model.)

W. E. HARRIS & E. B. EVANS.

ROLL FOR ROLLING METAL.

No. 288,176. Patented Nov. 6, 1883.



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UNITED STATES PATENT OFFICE.

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ROLL FOR ROLLING METAL.

SPECIFICATION forming part of Letters Patent No. 288,176, dated November 6, 1883.

Application filed July 7, 1881. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM E. HARRIS, of St. Louis, in the State of Missouri, and EDWIN B. EVANS, of Covington, in the State of Kentucky, have invented a new and useful Improvement in the Manufacture of Rolls for Rolling Metal, of which the following is a specification.

The object of our invention is to produce rolls of accurate finish with hardened surfaces, perfectly concentric, and with journals superficially hard to reduce friction and wear and enhance their durability, and internally tough to give the necessary strength to endure the severe torsional strain to which they are subjected in use.

Rolls for various purposes have been heretofore cast with chilled surfaces, and in order to impart the required smooth finish they are commonly ground and polished. In practice, however, it is found that rolls are invariably distorted to some extent in cooling, owing to unequal exposure or radiation, causing some parts to cool more rapidly than others, or from lack of homogeneousness in the body of metal, so that, however accurate the form of the chill-mold in which they may be cast, more or less distortion will exist in the roll, and it is not possible to correct this distortion by grinding and polishing, so as to impart an accurately cylindrical and concentric surface to such a distorted roll. Further than this, it has been found that journals of ordinary size chilled with the body of the roll in the act of casting are brittle by reason of the chill extending to too great a depth, and hence do not possess the requisite strength.

In carrying out our invention we cast a solid roll in a chill-mold with the journals of diameter in excess of that which they require to have for use. The entire surface of the chilled roll is then turned off in a lathe, so as to impart an accurately cylindrical form and eliminate all inequalities or irregularities which may have occurred in casting and cooling. The glassy hard surfaces of the journals are also turned off, so as to prevent a crack starting and remove enough of the chilled metal, bringing the journals down to the required diameter. By this means we make the entire surface of the roll and journals hard and accurately concentric, and by materially reducing the diameter of the journals are enabled, while retaining a hard chilled surface thereon, to leave a sufficient thickness of unchilled tough metal in the body of the journals to give the requisite strength to resist the torsional strain in use. In order that there may be sufficient thickness of tough unchilled metal in the center of the journals, we cast the journals, say, one-half of an inch larger in diameter than required for use, the chill extending, say, one-half of an inch deep, and then turn off, say, one-fourth of an inch all round, leaving one-quarter inch depth of chill in a journal sixteen inches in diameter after finishing. These are the preferred measurements; but of course there will be some variation, because in turning the tool must cut deeper at some parts than at others, and the depth of the chill in casting is liable to vary somewhat. On the body of the roll no more metal is turned away than is necessary to make the surface perfectly true, so that a thoroughly effective chilled surface is left all over. The roll and journals, having thus been turned off to the requisite dimensions and accurately true form, are finished and polished in the usual manner.

The accompanying drawing is a side elevation of one of our improved rolls, partly in section.

A represents the working-face; B, the shoulders; C, the journals, and D the coupling-necks.

The inner portions, *a* and *a'*, of the body and of the journals are of strong iron unchilled, so as to be tough and not liable to break, while the entire surfaces *c b a''* are chilled to a moderate depth in the finished roll, the surface metal having been turned off, as already explained.

We thus produce a roll of accurate finish and great durability, the surface wearing many times as long as an ordinary roll turned up in the usual manner, and being much more true than a chilled roll, ground and polished as here-

tofore. The journals also possess the requisite strength, while by their hard and true surface their durability is increased many fold, and likewise the durability of the brasses in which they work.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. The process herein described of manufacturing rolls for the rolling of metal, which consists in casting a roll in a chill-mold and subsequently turning off a portion of the chilled metal to bring the entire surface of the body and journals to the required concentric and cylindrical shape and the latter to the required diameter.

2. A rolling-mill roll having journals C, formed of strong soft-iron centers *a'* and chilled surfaces *a''*, lathe-turned, as set forth.

3. A rolling-mill roll having a strong soft-iron center, *a*, and chilled working-surface *c*, and journals C, having chilled surfaces *a''*, lathe-turned, substantially as set forth.

4. A rolling-mill roll having a strong soft-iron center, *a*, and chilled working-surface *c*, journals C, having chilled surfaces *a''*, lathe-turned, and coupling-necks D, as set forth.

5. A rolling-mill roll having chilled and lathe-turned journals, as set forth.

6. As an improved article of manufacture, a rolling-mill roll formed with a strong soft-iron center, *a*, chilled rolling-face *c*, chilled shoulders B *b*, journals C, and the necks D, the journals having soft centers *a'* and chilled surfaces *a''*, turned up true on the same centers as the roll.

WILLIAM E. HARRIS.
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