

(No Model.)

R. C. TOTTEN.

ROLL AND PINION.

No. 399,295.

Patented Mar. 12, 1889.

Fig. 1.

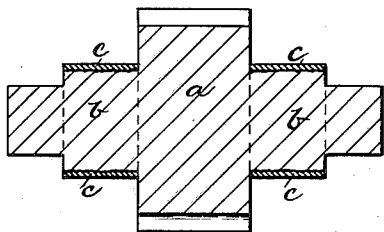


Fig. 2.

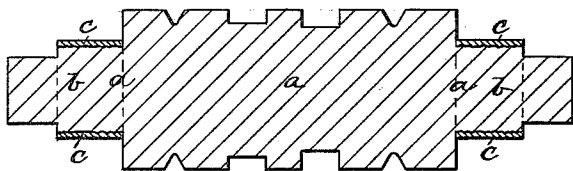


Fig. 3.

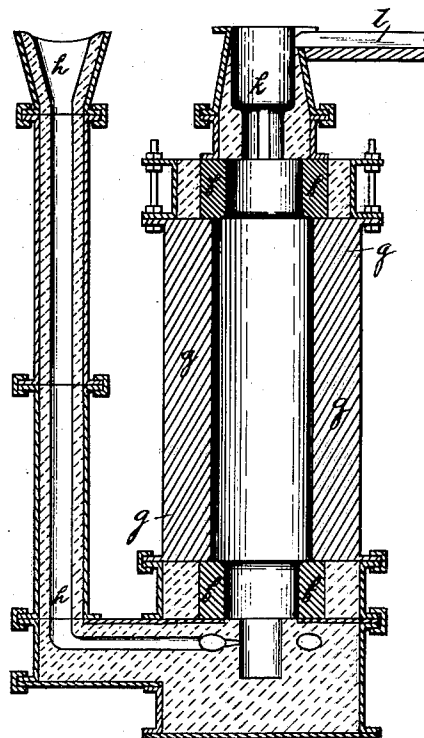
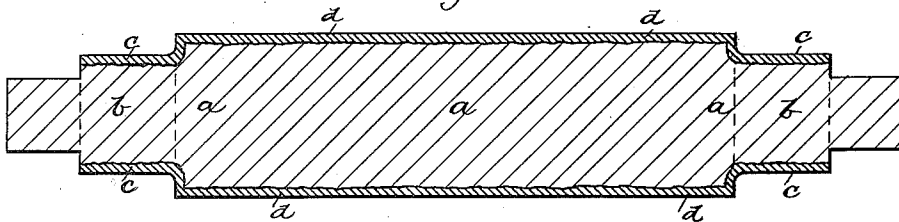


Fig. 4.

Witnesses:

J. H. Cooke
Robt. D. Totten

Inventor:

Robert C. Totten
By James D. Hay
Attorney

UNITED STATES PATENT OFFICE.

ROBERT C. TOTTEN, OF ALLEGHENY, PENNSYLVANIA.

ROLL AND PINION.

SPECIFICATION forming part of Letters Patent No. 399,295, dated March 12, 1889.

Application filed January 11, 1889. Serial No. 296,096. (No model.)

To all whom it may concern:

Be it known that I, ROBERT C. TOTTEN, resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rolls and Pinions; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the rolls and pinions employed in rolling-mills for the rolling of iron, steel, or other metals. The strongest form of rolls and pinions heretofore manufactured have been composed of steel, a low grade of Bessemer or open-hearth steel being employed for the purpose, and it being found that such steel rolls will withstand heavier strains than the ordinary cast-iron rolls which were previously and are still to a great extent employed, and the steel rolls giving greater satisfaction in other ways. A serious difficulty in the forming of such rolls and pinions has been found, however, in that there was liability of the necks or journals of these rolls being porous—that is, having blow holes or cells therein either in the face of the casting when coming from the mold or discovered by the turning off of such face in turning the journals, and though in making such castings attempts have been made to overcome these by the employment of a long sinker-head, so as to compact the cast by the weight of the metal above it, this difficulty has not been overcome. When such cells or imperfections exist in the necks or journals of the rolls, it is found that the dust, scale, and like substances in and around the roll will collect in any such cells or imperfections and act to cut out the bearings in which the rolls are mounted, and considerable difficulty has been experienced from this cause. It is also found that the steel journals are much more liable to heat up when running than the cast-iron journals, and this has frequently led to the stoppage of the rolls to permit the cooling of the journals, and therefore to the loss of considerable time in the working of the rolls.

The object of my invention is to provide a roll or pinion in which these difficulties are overcome, and in which a more perfect journal-face practically free from such imperfections and one which is not so liable to heat up can be obtained.

To these ends my invention consists, generally stated, in a roll or pinion formed of a steel body and having a thin shell or facing of chilled cast-iron upon the necks or journal-surfaces, it being found that by such chilled cast-iron face upon the steel roll a practically perfect surface free from cells or like imperfections is obtained, and one which is not liable to collect the dirt or scale and cut out the journal, nor to heat up rapidly during the operation of the rolls.

It also consists in combining with such roll having a steel body and a chilled cast-iron shell or face on the necks or journals a chilled cast-iron shell or facing upon the working-surface of the roll, so combining with the strong steel body all the advantages obtained in the solid chilled-iron roll.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a pinion embodying my invention. Fig. 2 is a like view of a roll containing the same. Fig. 3 is a like view of a roll having the chilled cast-iron shell or facing upon the necks or journals and working-surface of the roll, and Fig. 4 is a longitudinal section of a mold suitable for carrying out my invention.

Like letters of reference indicate like parts in each.

As shown in said several figures, the body or main portion *a* of the rolls or pinions is formed of a low or soft grade of steel—such as Bessemer and open hearth—in order to obtain all the desired tensile or transverse strength to sustain the strains to which it may be subjected, and I include under the term “steel” a steel or iron as low or free from carbon as can be properly melted and cast within a mold. Upon the necks or journals *b* of the roll or pinion I form the shell or facing *c*, which is composed of chilled cast-iron, such thin shells or facing being united to the steel body by fusion in such way as to form practically one casting. On the working-surface of the roll, as shown in Fig. 3, is a like shell or facing, *d*, of chilled cast-iron, united to the body of the roll in the same manner, so that in such roll the body portion *a*, including the necks or journals *b* and wab-

blers or connecting portions *e*, are formed of steel, while the shells or facings *c* upon the necks and the shell or facing upon the working-face are formed of chilled cast-iron. The shells or facings *c* upon the necks or journals need not be formed more than about three-fourths of an inch in thickness, as after they are once turned and trued there is practically no appreciable wear thereon, and the shell or facing *d* on the body of the roll is preferably made from three-fourths to one and one-half inch in thickness to provide for the turning or facing of the working portion of the roll when necessary.

In forming my improved roll or pinion I employ a mold of suitable construction, that shown in the drawings being such mold as is required for the formation of a roll having both facings of chilled cast-iron on the necks and the working portion of a roll, and the mold having the chill *f*, for forming the necks or journals, and the chill *g*, for forming the working-face *d*, the mold having the ordinary pouring-gate *h* communicating with the mold-cavity, preferably below the lower mold-chill, *f*, and having also the sinker-head *k* and a gutter or second gate, *l*, leading therefrom, through which any extra metal can escape.

In casting the roll I take a suitable mixture of cast-iron, which will chill properly when in contact with the mold-chills, and I melt a sufficient quantity thereof either to fill or to partially fill the mold, and I also melt ready for casting a proper portion of low-grade steel—such as Bessemer or open-hearth steel. The cast-iron is first poured into the mold, preferably through the pouring-gate *h*, and in passing down into the mold enters at the base thereof and rises within the mold, either filling or partially filling the same, and when it comes in contact with the several surfaces of the mold-chills it chills or congeals quickly, forming the chilled shells or facing for the roll. Immediately upon the casting of the chilling cast-iron, or very shortly thereafter, through the same gate I pour the molten steel, which, as it is heavier than the cast-iron, when it enters the mold-cavity raises the body of molten cast-iron within the mold and forces it out through the sinker-head, so that the extra molten cast-iron is carried off by the gutter or gate *l*, while the molten steel fills the mold, including the wabblers below the lower journal, as it is found that the steel, being heavier than the cast-iron, will force out the cast-iron which has previously filled the wabblers and take its place within the mold-cavity. The steel in thus filling the mold while in a molten condition unites with the cast-iron which has been

chilled by the mold-chill of the mold, the union being formed by the fusion of the surfaces of the metals and a perfect union which it is practically impossible to separate, even by crushing, being obtained.

In forming pinions or rolls which have not the chilled cast-iron shell or facing on the working portion thereof the mold employed is practically the same, except that the mold for forming the working-face or pinion-face of the roll or pinion is composed of sand or other suitable material, instead of the cast-iron mold-chill, and the operation of casting them is practically the same.

The mold is thus formed of the main or body portion *a*, the journals *b*, and the wabblers or connecting portions *e*, composed of a low grade of steel, and the chilled cast-iron shells or facings *c* upon the necks or journals; and the like shell or facing *d* upon the working-surface of the roll, united to the steel body thereof by fusion. The chilling of the said shells or facings *c d* compacts them in such manner that the formation of blow-holes, cells, or like imperfections is practically impossible, and a solid practically-perfect surface for the journals and working-surface is obtained, and when such chilled cast-iron shells or surfaces are turned and trued practically solid and perfect surfaces for the journals and working portion of the roll are obtained, thus overcoming the principal objection to the ordinary steel roll or pinion.

The chilled cast-iron shells or facings on the necks or journals, formed as above described, have the further advantage that as a more compact and solid metal is employed for such facings they are not nearly so liable to heat up under the heavy strain brought upon them during the rolling operation and therefore run more easily and require less power to operate.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A roll or pinion for rolling metals, having a steel body and a thin shell or facing of chilled cast-iron upon the necks or journals of the roll, substantially as and for the purposes set forth.

2. A roll for rolling metals, having a steel body and a thin shell or facing of chilled cast-iron upon the necks or journals, and upon the working-surface of the roll, substantially as and for the purposes set forth.

In testimony whereof I, the said ROBERT C. TOTTEN, have hereunto set my hand.

ROBERT C. TOTTEN.

Witnesses:

J. N. COOKE,
ROBT. D. TOTTEN.