R. C. TOTTEN.

Rolls for Rolling Metal.

No. 228,842. Patented June 15, 1880.

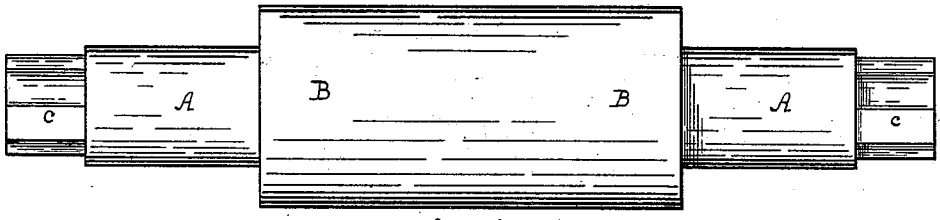


Fig. 1.

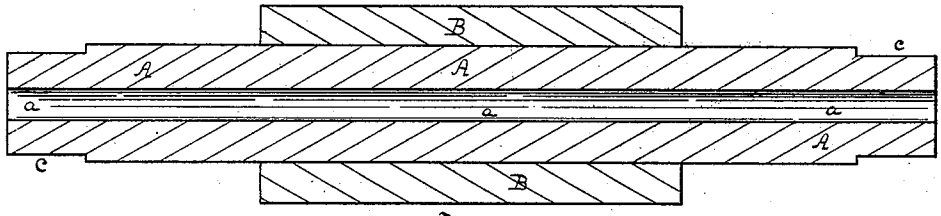


Fig. 2.

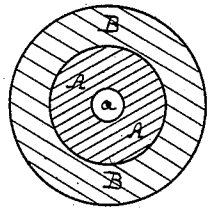


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT C. TOTTEN, OF ALLEGHENY, PENNSYLVANIA.

ROLLS FOR ROLLING METAL.

SPECIFICATION forming part of Letters Patent No. 228,842, dated June 15, 1880.

Application filed January 28, 1880.

To all whom it may concern:

Be it known that I, ROBERT C. TOTTEN, of Allegheny city, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rolls for Rolling Metal; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side view of my improved roll. Fig. 2 is a longitudinal vertical section thereof, and Fig. 3 is a vertical cross-section thereof.

Like letters of reference indicate like parts in each.

My invention relates to the manufacture of rolls for reducing iron, steel, and other metals.

Heretofore these rolls have generally been formed by casting at the same time both the body of the roll and the axle on which it is mounted out of cast-iron, homogeneous or cast steel, or other suitable metal. Where the rolls were cast solid, owing to the different dimensions of the coupling ends, necks, and bodies, and the fact that the outside cools most rapidly and the interior in cooling must necessarily shrink from the outer surface, they were thrown on a strain, and thereby made weak. It was also difficult to cast them true to shape, as the casting, especially when large, was liable to sag, on account of the weight of the metal, when the whole roll, being imperfect, was thrown aside.

The difficulty as to cooling the roll has been partially overcome in cast-iron rolls by forming a hollow opening through them for the escape of the heat. Rolls have also been formed by casting, shrinking, or otherwise securing a shell or ring, forming the outer surface of the roll, on a solid shaft or axle of either wrought or cast metal. Difficulty has also been experienced with these rolls because of the difference in expansion and contraction of the two bodies, which subjects the roll to heavy strain, and, where the shell and shaft are formed separate and secured together, in some cases causes the shell to become loose on the shaft.

The object of my invention is to overcome these objections by forming a roll which is made practically free from strain, and in which, when in use, the expansion and contraction is even both in the shell and the shaft or axle to which it is secured and on which it is mounted.

It consists in forming the shaft or axle on which the roll is to be mounted with a hollow opening extending centrally through it and securing on said hollow axle the outer shell, forming the working-surface of the roll.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation.

My improved rolls may be formed of cast or wrought iron, homogeneous or cast steel, or other suitable metal or combination of metals, being either chill or sand cast or rolled or forged to shape.

In the drawings, A represents the shaft or axle by means of which the roll is mounted in the housings, and B is the shell or ring forming the outer or working surface of the roll.

Through the shaft A is formed the hollow opening *a*, which extends from end to end through the center thereof. If the shaft is cast to shape, the hollow opening is formed by means of a sand or tubular metallic core, or the shaft is cast solid and the opening bored through. If it is formed of wrought metal, it may be rolled in a manner similar to the manufacture of tubing or hollow shafting, or rolled or forged solid and the hollow opening bored through.

The ends *c* of the shaft are shaped to fit a suitable coupling-box for connecting the roll to the motive power.

When the shell B is formed by casting, it is cast in a chill or in sand, according to its intended use, being either cast on the hollow shaft which is placed in the mold or cast separate, and the interior bored out by suitable tools, so as to fit the shaft neatly, the shell thus formed being slipped over the shaft and keyed or otherwise secured thereto.

Where it is desired to shrink the shell on the hollow shaft, it is bored so that the inner diameter is slightly less than the diameter of the shaft, and is expanded by heat and placed over the shaft, and upon cooling will shrink tightly thereon. If the shell is to be rolled or forged, it can be made on a large mandrel, partible if necessary, and afterward bored to fit the shaft, being secured by either of the means heretofore indicated.

When the rolls are in use the heat imparted to the surface of the rolls by the heated metal passing between them will pass through both the shell and hollow shaft and escape through the hollow opening in the shaft, causing an even expansion of both parts, and consequently preventing the loosening of the shell or the heavy strain on the roll where there is an uneven expansion of the two parts composing it. Upon the cooling of the roll the heat can pass off both from the outer surface of the shell and the center of the shaft, causing an even contraction and preventing the cracking of the shell on account of the retention of the heat in the shaft, as it is liable to where a solid shaft is used.

When both the axle and shell are cast to shape, as each is of the same thickness throughout and cools from the inner and outer surfaces, it will contract evenly, and is formed as free from strain as a casting can be made. I thus obtain a roll as nearly free from strain as can be formed, and prevent injury to its surface, except that consequent to the use to which it is subjected. It is stronger, more serviceable, and can be made of greater length than has heretofore been produced.

The shells may either be plain for the manufacture of plate or sheet metal or grooved for the manufacture of bars or shapes. It may also be desirable to make the shell and the hollow shaft of different material, according to the intended use and desired strength of the roll.

My invention will also be found advantageous in the manufacture of the heavy pinions used with rolls and other heavy machinery, for relieving them from the strain upon which they are thrown when the solid shaft and pinion are cast together.

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

1. The improved roll for rolling metals hereinbefore described and shown, having the shaft or axle on which it is mounted provided with a hollow opening extending centrally through it, and the outer shell, forming the working-surface of the roll, secured to said hollow axle, substantially as and for the purposes set forth.

2. The improved roll for rolling metals hereinbefore described and shown, having the shaft or axle on which it is mounted provided with a hollow opening extending centrally through it, and the outer shell, forming the working-surface of the roll, formed separately and afterward secured to said hollow axle, substantially as and for the purposes set forth.

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

ROBT. C. TOTTEN.

Witnesses:

L. R. LINDSAY,

A. ADAMS.