R. C. TOTTEN.

Cores for Molding Metal.

No. 195,966. Patented Oct. 9, 1877.

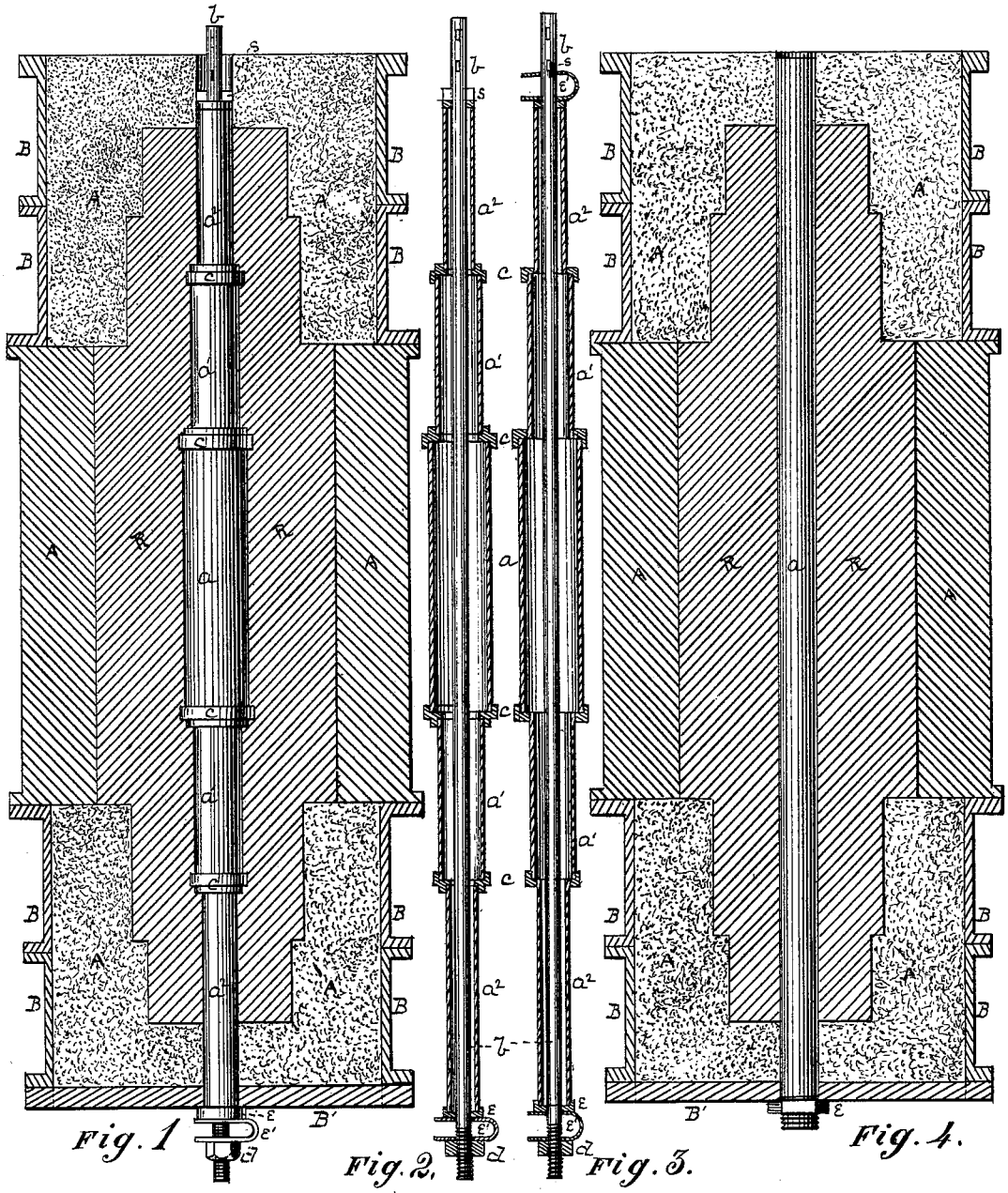

Fig. 1 Fig. 2. Fig. 3. Fig. 4.

Witnesses.
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ROBERT C. TOTTEN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN CORES FOR MOLDING METAL.

Specification forming part of Letters Patent No. **195,966,** dated October 9, 1877; application filed May 4, 1877.

To all whom it may concern:

Be it known that I, ROBERT C. TOTTEN, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Roll-Casting; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which, like letters indicating like parts—

Figure 1 is a longitudinal sectional view of a mold, core, and roll-casting illustrative of my improvement. Figs. 2 and 3 are sectional views of the core; and Fig. 4 is a view similar to Fig. 1, but showing a plain, unjointed, tubular core.

While I have shown my improvement in its application to the casting of hollow chilled rolls, I do not limit myself in the use of it thereto, as it may be employed with useful results in connection with ordinary sand molds in roll-casting, a sand mold being substituted for the chill.

The rolls as cast are represented at R R′, the chills at A, the sand molds to form the necks and coupling ends at A′, the flasks at B, and the bottom plates at B′.

This kind of casting is commonly done with the mold standing vertically, as shown in the drawing.

The parts thus far named are of the usual or any known construction, and the usual clamps, gates, sprues, &c., are to be provided in any of the ways known in the art.

For various reasons a hollow roll is theoretically better than, or preferable to, a solid roll, other things being equal; but thus far in the art the effort to cast such rolls has, on account of mechanical and practical difficulties, been attended with little or no success.

In my improvement I employ a hollow metallic core, made preferably in sections, $a\ a^1\ a^2$, two or more in number, the one having the largest bore, a, being at the middle of the roll, and the interior diameter of contiguous sections lessening toward the end of the core. These sections may be put together, in any convenient way, by being seated endwise in couplings c, as in Fig. 2, or screwed into such couplings, as in Fig. 3, or screwed one into another, or otherwise, as may be preferred.

Longitudinally through the tubular core thus made I run a rod, b, and on its lower end I screw a nut, d, or use in place of the nut a key or other equivalent device.

On the lower end of the tubular core is a collar or flange, e, and between it and the nut d is a U-spring, e', or other suitable construction of spring. The upper end of the rod has a like key, s, or bearing, on the upper end of the tubular core, as in Figs. 1 and 2, or a key and spring, $s\ e'$, as in Fig. 3.

As shown in the figures, any desired number of key-holes may be made for purposes of accurate adjustment. Mechanical equivalents may be employed at the upper as well as the lower end of the rod. With a tubular core thus constructed, provision must be made for various forces. First, the molten metal, as run in, particularly in bottom casting, tends to float or lift the core vertically up. To guard against this I anchor the core by means of the collar e, or other suitable device, which, projecting from the core, shall engage the fixed bottom plate B′. And the upper key, in connection with the rod b and its lower connections, tends also to the same end, as well as to prevent the sections from separating, especially if they are jointed in the manner shown in Fig. 1. Also, the molten metal, coming in contact with the core, tends, first, to expand it, and, when cooling, to contract it to its original length.

That these forces may act with equal effect in opposite directions, I employ the rod b, with its nuts or keys and spring or springs. Under the expansive force of the heat the tubular core will expand or elongate. The spring or springs e' act as a cushion, and also as an equalizer, to permit of elongation without breakage, and to preserve or secure an equal amount or length of elongation at each end, the force acting at the upper end, if no spring is used there, being transmitted by the upper key to, and by means of the lower spring e' equally divided with the force acting at the lower end. A like result follows from the use of a spring at each end. A reverse action, distributed or divided in like manner, takes place when, in cooling, the tubular core contracts or shortens, and the spring also acts to draw all parts toward the center, so as to overcome, in part at least, the tend-

ency of the roll in shrinking to tear or pull the sections apart. The use of the rod *b*, with its connections for the purposes thus set forth, is of special importance when the sections are jointed, as in Fig. 2.

In Fig. 4 I have shown a plain tubular core anchored by a nut, in the manner described. No other feature of my improvement is shown in this figure.

One element of advantage resulting from the use of a tubular core interiorly largest at the middle consists in the fact that I thus get the maximum area of interior cooling-surface in the part where the greatest liability to overheating exists, and I get it with so small a tubular opening in or toward the reduced roll-necks that all the parts are properly proportioned with reference to the uniform strength of the roll in all its parts.

I claim herein as my invention—

1. In casting hollow rolls, a tubular metallic core made in sections of different interior diameters, substantially as set forth.

2. The combination of tubular sections *a* a^1, two or more in number, with a rod, *b*, having a bearing on each outer end of the end sections, and an interposed spring at one end or both ends, as may be preferred, substantially as described.

3. A tubular core, collar, spring, and nut, or described equivalents, in combination with the bottom plate B′ of a roll-mold, substantially as specified.

4. The combination of bottom plate B′, a tubular core extending through the bottom plate, and a collar or other suitable projection on the core engaging the under side of the bottom plate, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ROBERT C. TOTTEN.

Witnesses:
J. J. McCORMICK,
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