T. WHITEHOUSE.

MANUFACTURE OF METAL ROLLS.

No. 185,374. Patented Dec. 12, 1876.

FIG. 1.

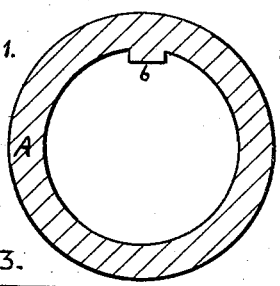


FIG. 2.

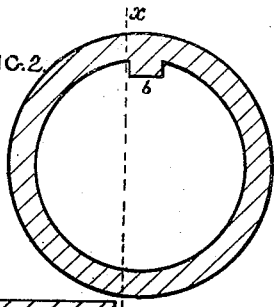


FIG. 7.

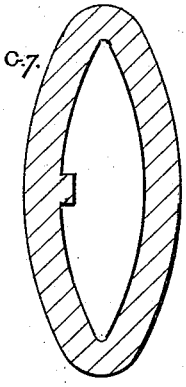


FIG. 3.

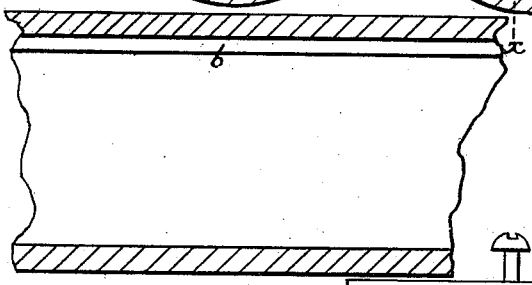


FIG. 5

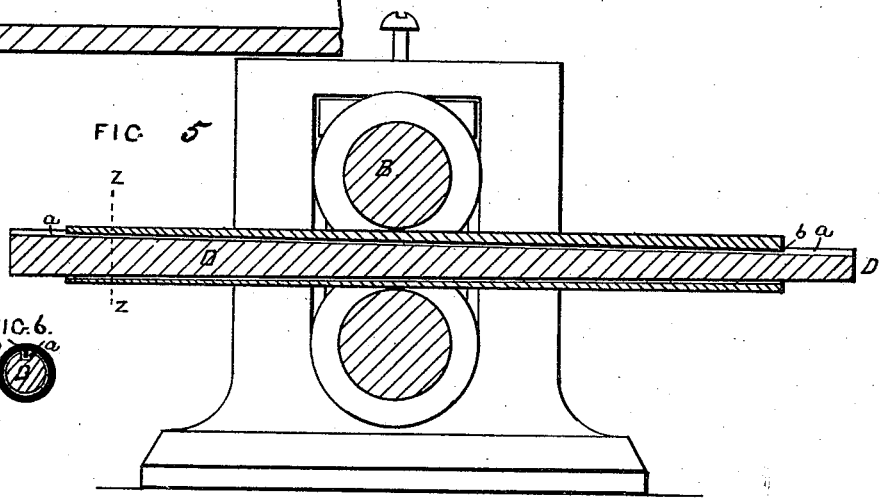
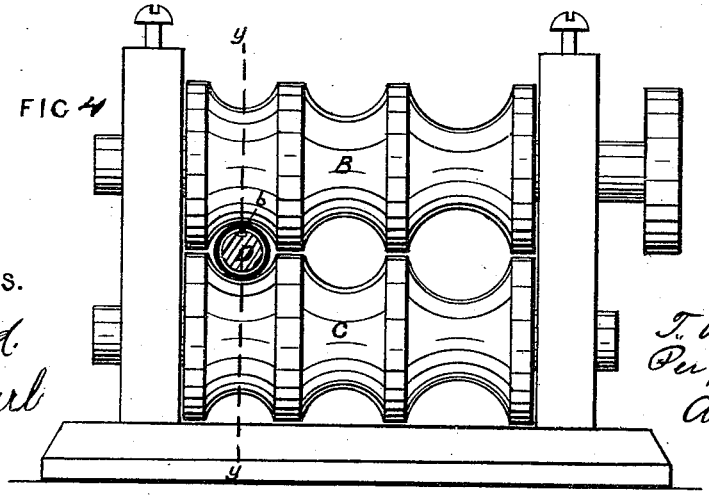


FIG. 6.

FIG 4



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UNITED STATES PATENT OFFICE.

THOMAS WHITEHOUSE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO AMERICAN TUBE WORKS, OF SAME PLACE.

IMPROVEMENT IN THE MANUFACTURE OF METAL ROLLS.

Specification forming part of Letters Patent No. **185,374**, dated December 12, 1876; application filed September 6, 1876.

To all whom it may concern:

Be it known that I, THOMAS WHITEHOUSE, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in the Manufacture of Metal Rolls, of which the following is a specification:

This invention relates more particularly to the manufacture of copper print-rolls, although, as will appear from the description hereinafter given, it is also applicable to the manufacture of rolls from other metals, to be used for the same or other purposes.

The invention more particularly pertains to the formation or production upon the inner side or periphery, and along the length of the roll, of a rib or spline, or other equivalent device, so that when the roll is placed upon its carrying-shaft it will be held against turning on said shaft, and be made to turn in conjunction with the shaft.

Under this invention the said spline or rib, or other equivalent device, is produced or formed upon and along the length of the inner side or periphery of the metal roll by casting, in the usual manner of casting metals, the tubular casting from which the roll is to be made with a spline or rib, or other equivalent device; and, again, this casting is placed on a cylindrical mandrel or former, which is grooved or otherwise suitably formed to receive the said rib or spline, or other equivalent device, and subjected to pressure, either by rolling or drawing, or otherwise, so as to compress the metal composing it, together with its spline or rib, to the requisite degree of density and solidity, and to also the better shape it, both interiorly and exteriorly, for use as desired, all substantially as hereinafter described.

In the accompanying plate of drawings, Figure 1 is a cross-section of a hollow or tubular metal casting suitable for making a roll according to this invention; Fig. 2, a similar section of the roll as made; and Fig. 3, a section on line *x x*, Fig. 2.

In the manufacture of a tubular roll under this invention, first, I make a metal casting, A, of a hollow and tubular shape, and at the same time form along the length of its inner side or periphery a rib or spline, *a*. The internal diameter of the casting should be equal to, or thereabout—that is to say, about one-eighth of an inch larger than—the diameter of the shaft on which it is to be used as a roll, and the thickness of the metal of the casting should be sufficient for it to be reduced to the proper density and to be extended in length. I now take this ribbed tubular casting A, preferably heated, and place it on a mandrel or former having a groove or other proper construction to receive the rib of said casting, which mandrel, preferably, is also heated, and I pass the two together, as described in the specification accompanying my now pending application for Letters Patent of the United States, between grooved pressure-rolls, which are shaped to work upon the outer side of the casting, and to compress and distend the metal. This compression increases the density and solidity both of the body and rib of the casting, and also improves its shape both exteriorly and interiorly.

In the drawings, Fig. 4 is a front view of a set of grooved pressure-rolls and mandrel or former suitable for the purpose above described; Fig. 5, a section on line *y y*, Fig. 4; and Fig. 6, a section on line *z z*, Fig. 5.

B is the upper and C the lower pressure-roll, and D the mandrel or former, which is grooved in its length, as at *a*, to receive the rib or spline *b* on the inner side or periphery of the casting. After compressing said ribbed casting A, as above described, I draw it with a suitable internal mandrel or former through a die, in the usual manner of drawing tubes, which operation gives it a more perfect shape, both exteriorly and interiorly, and also additionally compresses the metal. After this I smooth off its exterior by turning it in any suitable lathe, in the usual manner.

In lieu of running the ribbed metal casting A and its mandrel together between the pressure-rolls, as described, the mandrel may be held stationary and the ribbed casting drawn over it; and, again, the ribbed casting, without being rolled, may be drawn with its mandrel directly through a die, in the ordinary manner of drawing tubes, and obtain the requisite

density, solidity, and shape, both of the body and of the rib of the casting; and, again, the said ribbed casting, when on its former or mandrel, may be compressed in many other ways than those particularly specified—as, for instance, by hammering the metal composing the casting upon its outer side. It is preferable, however, to roll the ribbed casting as I have particularly described. It is preferable to have the roll of an inside taper from end to end, and this taper may be obtained either by the casting process or by the after-rolling or compression of the metal, or by both, and when the taper is produced by the rolling or compression of the metal the mandrel should be of the taper desired; and, again, if the casting is made with said taper and afterward rolled or otherwise compressed, then a mandrel of the desired taper is used.

In the drawings a tapering mandrel is shown, and, again, the completed roll shown tapers interiorly from end to end. The inside taper of the roll enables the roll to be the better secured on its shaft against movement in the length of the shaft, and if rolled or compressed on a mandrel or former it can be the easier detached.

The casting A is made of an even thickness, and, by preference, it is cast of an oval shape, as shown in Fig. 7, and being first opened out into a round shape or form, or substantially so, according to an invention for which I have made application for Letters Patent of the United States, bearing even date herewith, it is then proceeded with as has been described in reference to a round casting, such as shown in Fig. 1.

The rib or spline may be cast of various shapes, and, if desired, the casting may have more than one, and in lieu of ribs grooves may be formed, in which case the mandrel or former must be made to conform; but a rib or spline is preferable.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

In the manufacture of hollow metal rolls with an internal rib or spline, the improved method of casting the hollow blank from which the roll is to be made with an internal rib or spline, and then compressing and shaping it on a mandrel adapted to receive it and its rib or spline, all substantially as described.

THOS. WHITEHOUSE.

Witnesses:

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