H. WATERMAN.

Making Steel Rollers.

No. 21,039. Patented July 27, 1858.

Fig. 3.

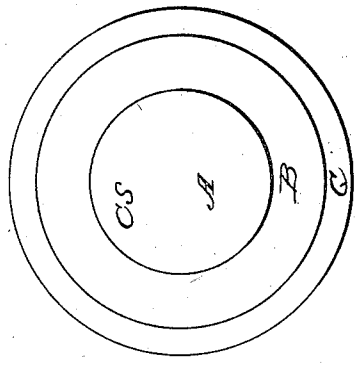


Fig. 1.

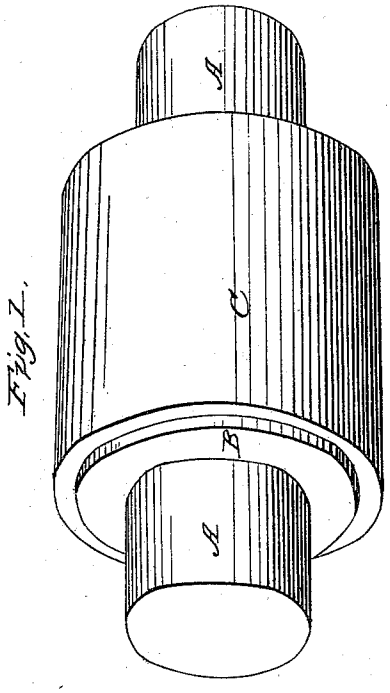
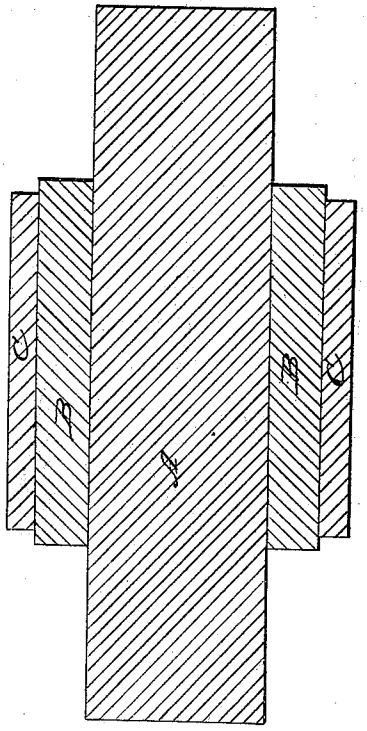


Fig. 2.



UNITED STATES PATENT OFFICE.

HENRY WATERMAN, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN MAKING STEEL ROLLERS.

Specification forming part of Letters Patent No. **21,039**, dated July 27, 1858.

To all whom it may concern:

Be it known that I, HENRY WATERMAN, of the city of Brooklyn, (late Williamsburg,) county of Kings, and State of New York, have invented a new and useful Method of Making and Hardening Steel Rolls for Engravings and for Jewelers' Work; and I do hereby declare the following to be a full and exact description, reference being had to the accompanying drawings, making a part of this specification, of which—

Figure 1 is a perspective view. Fig. 2 is a longitudinal section. Fig. 3 is a view of one end.

The nature of my invention consists in constructing metal rolls of steel and iron in two, three, or more pieces, so as to permit the journals to be hardened and reduced to any required temper without danger of cracking or warping, and the outer rim or surface to be hardened and shrunk on at the time of hardening without subjecting the other portions of the rolls to the heating process, thus preserving the true form and surface of the rollers. The common method of making steel rolls is of a single bar of steel, the ends turned down to form the journals, and when subjected to the required heat for hardening the result is they are extremely liable to warp, and not unfrequently to crack in the journals or burst on the larger portion of the outer surface, and are thereby entirely lost, and in case they only warp or spring in hardening the only manner in which they can be made true to their journals is by the slow process of grinding.

Another method is to form a cylinder of steel turned true internally and externally and hardened in the usual manner, and the bar which forms the journals or arbors is fitted and driven into the hardened cylinder. This method is very uncertain as to its fitting the entire surface sufficiently close to be reliable under the great pressure that rolls are subjected to.

My method differs materially from either of the above, and by it the most perfect and reliable hardened-steel rolls can be made for one-fourth the cost of ordinary ones.

In order to enable others skilled in the arts to make and harden my improved rolls, I will describe the mode in detail.

The shaft A, which forms the journals to run on, is made of the best cast-steel, is turned to the required dimensions and tempered, if desired, onto which is carefully fitted a cast or wrought iron cylinder B, of suitable dimensions, made very firm by shrinking it onto the shaft A, which is then turned off true. I then form a cylinder C of cast-steel of about half an inch in thickness of the required width, which is fitted accurate and very close to the iron cylinder B. The external surface of the roll is then turned off as true as possible on the journals, and then after marking the two, so as to replace the steel cylinder C exactly in the position where it was fitted on the iron cylinder B, I remove it and subject it to the required heat for hardening. When at the right heat, I replace it as quickly as possible on the iron cylinder B and plunge the whole into the hardening-bath. The steel cylinder on cooling and hardening will contract to fit the iron perfectly, and will be found to be as true and solid as if it were all of one piece.

Another important feature in my invention is that should the surfaces become worn or damaged in any way the steel cylinder C may be removed by heating it till it sufficiently expands to come off. It can then be annealed, refaced, and hardened again, as above described, thereby saving the rolls, making them as good as new.

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

My improved compound rollers, consisting of the steel shaft A, the iron cylinder B, and the steel cylinder C, forming the surface, when fitted together and hardened in the manner specified.

HENRY WATERMAN.

Witnesses:
J. G. MORGAN,
F. M. WILSON.