W. ROWLAND.

Process of Shaping and Hardening Steel Articles.

No. 51,087. Patented Nov. 21, 1865.

Fig. 1.

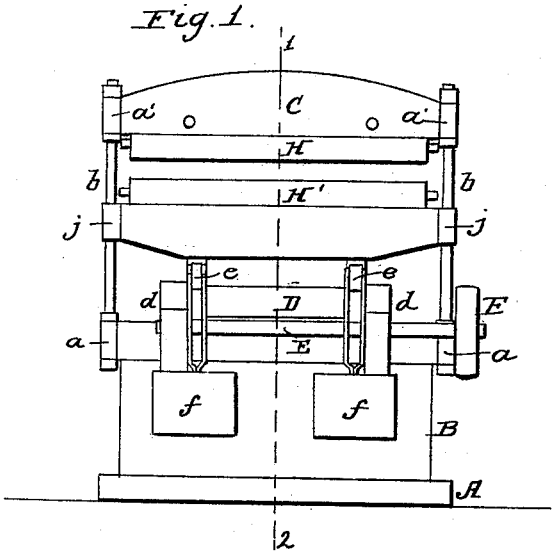


Fig. 2.

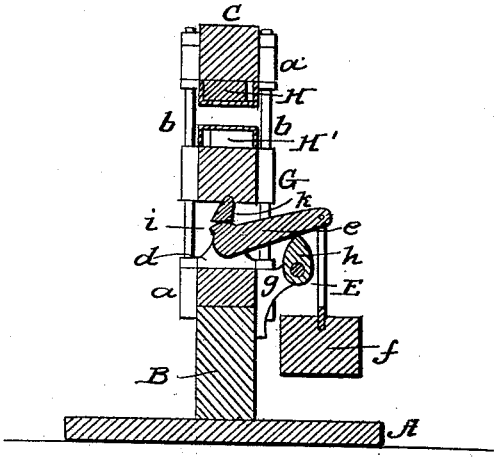
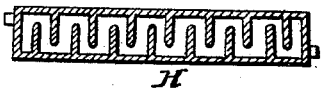


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

WM. ROWLAND, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED PROCESS OF SHAPING AND HARDENING ARTICLES OF STEEL.

Specification forming part of Letters Patent No. **51,087**, dated November 21, 1865; antedated November 9, 1865.

To all whom it may concern:

Be it known that I, WILLIAM ROWLAND, of Philadelphia, Pennsylvania, have invented a Process of Simultaneously Hardening and Shaping Articles of Steel; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists in the process of simultaneously shaping and hardening articles of steel by subjecting them, while in a properly-heated state, to a gradually-applied pressure between cold dies, so that the usual delay and tedious manipulation required in straightening and shaping steel articles hardened in the usual manner and warped by hardening may be obviated.

In order to enable others to practice my invention, I will now proceed to describe the manner of carrying it into effect.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of apparatus by means of which I carry out my process of hardening and shaping articles of steel; Fig. 2, a section on the line 1 2, Fig. 1, and Fig. 3 a detached sectional view of one of the dies.

Similar letters refer to similar parts throughout the several views.

A is the base of the machine, on which is a block or table, B, on each end of the four corners of which is a projection for receiving the lower end of a vertical guide-rod, *b*, the upper ends of the four rods being secured to the cross-piece C.

To one side of the block B are secured two brackets, *g g*, in which turns a shaft, E, and near each end of the latter is a cam, *h*, one end of the shaft, which projects beyond the side of the machine, being furnished with a driving-pulley, F.

On the top of the block B are two boxes, *d d*, in which turns a shaft, D, and from the latter, near each end of the same, projects an arm, *e*, each of which bears on one of the cams *h*, and has a weight, *f*, suspended to its outer end.

Above the shaft D is a plate, G, which is guided by the rods *b*, and into a recess at the under side of the plate G, near each end of the same, fits a rounded end of a dog, *k*, of the form shown in the drawings, the lower face of the dog bearing against the face of a cam, *i*, which projects from the shaft D.

To the under side of the cross-piece C is attached a hollow oblong die, H, and to the upper side of the plate G is secured a similar die, H′. In the present instance the interior of each die is constructed in the manner illustrated in Fig. 3, so that there may be a zigzag passage for cold water, which is admitted at one end of the die and discharged at the other. On turning the shaft E a vertical reciprocating motion will be imparted to the lower die, H′, through the devices described.

In manufacturing saws, shovels, and other similar articles of thin steel, it has heretofore been usual to first heat the article to a proper temperature, and then to harden it by sudden cooling, and subsequently reducing it to the desired temper by reheating. In thus treating the steel articles much delay is occasioned and the necessity of tedious manipulation involved owing to the fact that the pieces become warped by sudden hardening, and must be straightened either by an elaborate process of hammering or by the process of straightening and tempering simultaneously described in the patent granted to John Sylvester, August 31, 1852—a process which can only be practiced on flat pieces. I simply place the piece of steel in a properly-heated state on the lower die, while the latter is down, by the mechanism described, which is analogous to that heretofore used in presses. The lower die is elevated and the piece of steel pressed against the upper die. As both dies are cold and the pressure is great, the piece of steel is suddenly chilled, and consequently hardened, and at the same time straightened, the subsequent tempering, if tempering be necessary, having little or no tendency to alter the shape of the piece.

An important advantage of my process is that it is not confined to the hardening and straightening of flat pieces, as the dies can be made to conform to the shape of any steel article which it may be desirable to harden and form simultaneously.

Although I have shown and described certain machinery for carrying out my process, it

will be evident that mechanism of a different construction may be employed for obtaining the desired pressure, and that the dies may be maintained in the desired cool state by means other than that described. I therefore do not desire to confine myself to the mechanism or apparatus herein described. I moreover wish it to be clearly understood that I do not desire to claim, broadly, the hardening and straightening of articles of steel by means of cold dies unless the pressure be applied gradually, inasmuch as Jas. Dodge, in his patent of April 16, 1861, and H. Waterman, in his patent of May 27, 1851, describe the use of cold dies for the same purpose. In both of these cases, however, the impact of one of the dies against the piece of steel was relied upon for obtaining the desired condensation and consequent hardening of the metal, whereas in my invention the movable die is gradually applied to the object, the hardening of which is effected by the intimate contact of the cold surface of the die, and not by impact.

I therefore claim as my invention and desire to secure by Letters Patent—

The process of simultaneously shaping and hardening articles of steel by subjecting them, while in a heated state, to a gradually-applied pressure between cold dies, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. ROWLAND.

Witnesses:

HENRY HOWSON,

JOHN WHITE.