

R. A. Stanton.

Tempering Steel.

N^o 36,269.

Patented May 19, 1862.

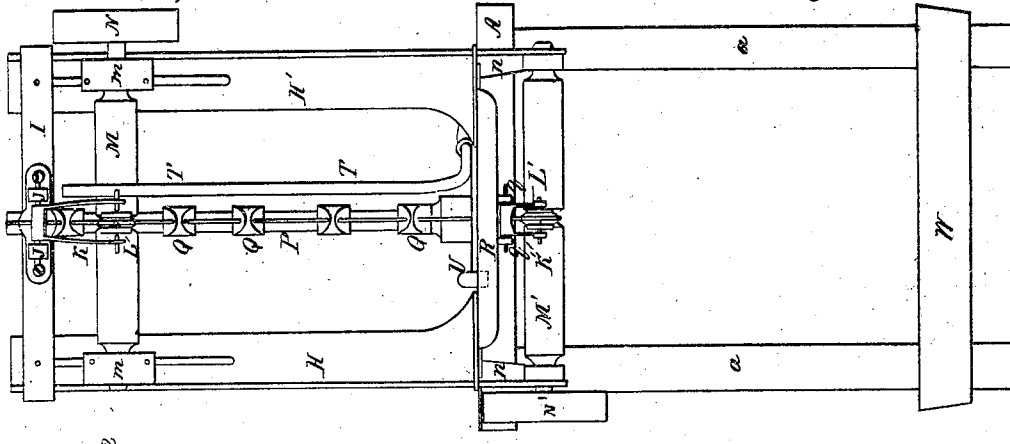


Fig. 2

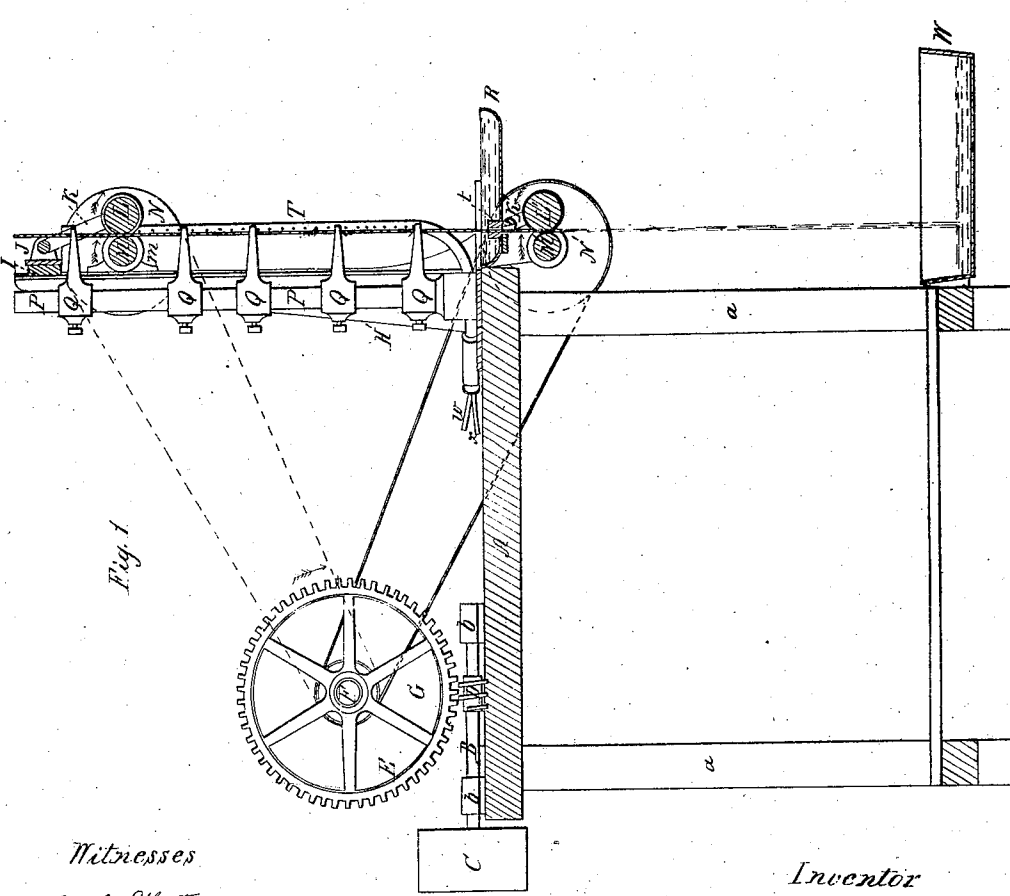


Fig. 1

Witnesses
Charles E. Foster
Charles Howson

Inventor
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Att'y for R. A. Stanton

UNITED STATES PATENT OFFICE.

RICHARD A. STRATTON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO G. W. CARR & CO., OF SAME PLACE.

APPARATUS FOR HARDENING STRIPS OF STEEL.

Specification of Letters Patent No. 36,259, dated August 19, 1862.

To all whom it may concern:

Be it known that I, RICHARD A. STRATTON, of Philadelphia, Pennsylvania, have invented an Improved Mode of Hardening Strips of Steel, Steel Wire, &c.; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon.

My invention consists in hardening strips of steel, or steel wire, by passing them, while red hot, at an uniform speed, vertically through a hole in a trough containing water or other suitable fluid, when a constant stream of the latter is allowed to pass through the said opening in contact with, and so as to surround the strips of steel or steel wire as explained hereafter.

My invention also consists in heating the said strips by passing them vertically through guides, and in contact with or adjacent to a series of flames as described hereafter.

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

In reference to the accompanying drawing which forms a part of this specification, Figure 1 is a vertical section of a machine for practicing my improved mode of hardening strips of steel, steel wire &c. Fig. 2 a front view.

A is a bench supported by legs *a*, and in suitable boxes *b*, *b* secured to this bench at the rear of the same turns a shaft B, which is furnished at the outer end with a pulley C for receiving a driving belt, a worm D being also secured to the same shaft, and this worm gearing into the teeth of the worm wheel E on the shaft F which turns in suitable standards G secured to the bench, and which has at each end a pulley alluded to hereafter. To the same bench A and near the front end of the same are secured the two standards H and H' which are connected together at the top by the cross bar I, and midway between the opposite ends of the latter is secured a bracket J to which the upper end of the forked arm K is hung by means of a pin passing through the said arm and through projections on the bracket. To the lower end of the forked arm is hung a pulley L on which is formed a collar arranged to fit freely in a groove formed in

the roller M the journals of which roller turn in boxes *m*, *m*, so attached to the standards H, and H' as to be rendered adjustable thereon, one journal of the roller projecting beyond the box in which it turns so as to receive a pulley N. Midway between the two standards H and H', and to the bench A, is secured a vertical bar on which a number of brackets Q are so fitted as to slide freely, and to be readily secured by set screws or their equivalents after adjustment.

To the front end of the bench is secured a tray R on the bottom of which is a projection *t* and in this projection is a hole somewhat larger than the strip of steel or steel wire which has to be hardened, and which has to pass downward through the said hole. Below this tray is another roller M' the journals of which turn in hangers *n*, *n*, secured to the under side of the standards H and H'; one projecting journal of this roller being furnished with a pulley N', and having a groove for the admission of a collar on the pulley L' which is hung to the lower end of the forked arm K', the latter being suspended by means of a pin to projections *q*, *q* on the under side of the tray R. The collar on the pulley L has a groove coinciding with a similar groove on the roller M', the two grooves combined presenting an opening between pulley and roller of a proper size and form to admit the strip of steel or steel wire which has to be hardened, and which is guided by the said grooves, the roller L' by its own weight, or by the application of any mechanical pressure having a tendency to force the strip of steel against the groove of the roller M. The same remarks will apply to the upper pulley L, and upper roller M.

T is a tube in the vertical portion of which are a series of perforations, the lower end of the tube communicating with the two tubes *w* and *x*, one for the admission of common illuminating gas and the other for the admission of atmospheric air.

Oil, water, or other suitable fluid flows through the pipe *v*, into the tray R, in which such a supply is constantly maintained, that the water will pass in a continuous stream from the tray through the hole in the projection *t*.

In the present instance the apparatus is illustrated as in the act of hardening steel wire cut into lengths of two feet or there-

abouts, and suitable for forming the ribs and stretchers of umbrellas and parasols. By means of the worm D a slow motion is communicated to the wheel E, and thence through the two pulleys on the shaft F, and pulleys N and N' to the rollers M and M', the latter turning in the direction pointed out by the arrows. A piece of wire to be hardened is passed vertically through an opening in the projecting portion of the highest bracket Q, the said opening being directly above that presented by the grooves of the rollers L and M through which opening the wire also passes, and as it is pressed against the groove of the roller M by the roller L, the former turning in the direction of the arrow will draw the wire downwards, passing it through the projections of the series of brackets Q, through the hole in the tray R, after which it is drawn down by the roller M' in conjunction with the roller L'. Thus a series of pieces of wire take the course described one piece after the other in continuous succession, and at an uniform speed. The distance between the upper and lower rollers is such in respect to the length of the pieces of wire that every piece is acted on either by the upper or lower rollers from its insertion until its discharge into the trough W. In the meantime the gas and air passing through the perforations in the tube T being ignited, presents a vertical row of flames, the heat of which is intensified by the introduction of a plentiful supply of air into the tube, and these perforations are so situated in respect to the course taken by the pieces of wire, as to subject the latter to the direct action of the flames. As the pieces of wire therefore pass slowly downward they have imparted to them that uniform red heat necessary prior to the hardening, and in this heated state they pass through the hole in the tray, through which water is constantly flowing, so that the red hot wire is completely surrounded by a vertical stream of water, and is thereby thoroughly and rapidly cooled, and reduced to the desired hardness. The advantage of this running stream of water and its certain effect on the heated metal will be understood when the fact is known that water in motion has a much more rapid cooling action on red hot metal than when the latter is dipped into a

cistern of still water. Moreover in passing red hot metal into a cistern of water, the latter becomes disturbed in the neighborhood of the metal so as to act unequally on the surface of the same, but when a constant flow of water is maintained in contact with, and surrounding the metal moving slowly in the direction of the stream, this effervescence will not take place, but the hardening process will be simultaneous with the contact of the metal with the water, and as the hardened metal continues to be surrounded with water no reduction in the hardness can ensue. Unless the strips of heated steel however are maintained in a perfectly straight condition, as they come in contact with the water, they would be bent or warped when hardened, hence the use of the rollers and brackets for keeping the wire straight, while it is acted on by the series of flames, and while the hardening process is continued.

In place of one perforated tube two may be used so as direct two sets of flames, one to one side, and the other to the opposite side, of the wire.

Continuous strips of steel or steel wire may be hardened in the above apparatus, as also may saw blades, and other implements of thin steel.

Without confining myself to the precise mechanism herein described, I claim as my invention and desire to secure by Letters Patent:

1. Hardening strips of steel or steel wire by passing them at an uniform speed, and in a red hot state vertically through an opening in a trough containing water or other suitable fluids, when a constant stream of the latter is allowed to pass through the said opening in contact with and so as to surround the wire as herein set forth.

2. Heating the said strips of steel or steel wire by passing them vertically through guides, and in contact with or adjacent to a series of flames as herein described.

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

RICHARD A. STRATTON.

Witnesses:

HENRY HOWSON,
JOHN WHITE.