J. H. WARRINGTON.

Annealing-Metal.

No. 169,320. Patented Oct. 26, 1875.

FIG. 1.

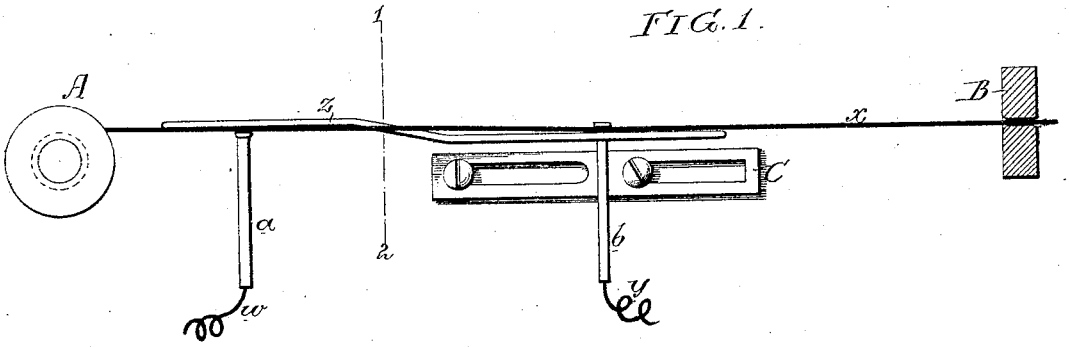
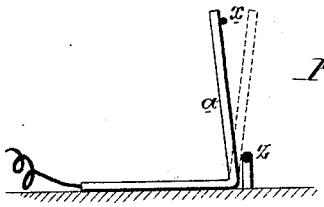


FIG. 2.



Witnesses,
Harry Smith
Hubert Howson

Joseph H. Warrington
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

JOSEPH H. WARRINGTON, OF CAMDEN, NEW JERSEY, ASSIGNOR OF ONE-HALF HIS RIGHT TO WILLIAM J. FLANAGIN, OF PHILADELPHIA, PA.

IMPROVEMENT IN ANNEALING METALS.

Specification forming part of Letters Patent No. **169,320**, dated October 26, 1875; application filed April 9, 1875.

To all whom it may concern:

Be it known that I, JOSEPH H. WARRINGTON, of Camden, Camden county, New Jersey, have invented a Process of, and Apparatus for, Annealing Metals, of which the following is a specification:

The object of my invention is to soften or temper wire or other thin metal strips, by causing currents of electricity to impart the heat required; the application of my invention to wire-drawing apparatus being represented in the accompanying drawing, in which—

Figure 1 is a plan view of an apparatus for softening wire during the operation of drawing the same; and Fig. 2, a vertical section on the line 1 2, Fig. 1.

A represents a reel of wire, and B a draw-plate.

Owing to the condensation and consequent hardening of the metal, it is necessary, after the wire has passed through one or more draw-plates, to anneal it, for which purpose it is customary to anneal the coil by the usual process of first heating and then slowly cooling. To avoid this tedious operation, I heat the wire while it is passing through the drawing-machine by an electric current, transmitted through the wire between two fixed poles, in contact with which the wire passes as it is being drawn. These poles consist of a pair of insulated metal bars, *a b*, arranged between the draw-plate and the reel, and possessing a slight elasticity, which maintains them in contact with the wire; and to these bars are connected wires *w y*, attached to the opposite poles of a battery, or other galvanic or electric apparatus.

That portion of the wire between the bars *a b* will serve to conduct from one bar to the other a current, which will impart to this portion of the wire a temperature varying with the intensity of the current; and, as the wire is in constant motion, and in contact with the bars, it must necessarily be heated and softened before it reaches the draw-plate, thereby obviating the necessity of annealing the coils of wire from time to time.

In wire-drawing it is usual to place on one bench or frame a succession or series of reels, draw-plates, and drawing-mechanism, in which case one battery may be used in connection with the different drawing appliances.

It is important that the temporary disuse of one drawing-machine should not disturb the action of the electric current in the others. In order to provide for this the wire is made to pass from the reel in an indirect course, the wire passing on one side of the bar *a* and on the opposite side of the bar *b*, and the tension on the wire tends to maintain both bars free from contact with a rod, Z. Should the wire break, however, or the drawing mechanism be out of use, both bars *a* and *b* will, owing to their elasticity, be brought in contact with the rod Z, which will carry off the electric current without disturbing those currents which are employed in connection with other drawing-machines.

Either or both of the bars *a* and *b* may be secured to an adjustable plate, C, or may be made otherwise adjustable, so as to regulate the distance between the bars, as the intensity of the current or the thickness of the wire may require.

Although I have described my invention as applied to the softening or annealing of wire in wire-drawing apparatus, it will be apparent that it may be employed in tempering thin strips of metal, or in apparatus for hardening wires or strips of steel, such, for instance, as umbrella-ribs.

I claim as my invention—

1. The process of tempering or softening wire or other strips of metal, by subjecting the same to the influence of an electric or galvanic current, as set forth.

2. The mode of heating continuous wires or strips of metal, by traversing the same in contact with bars *a b*, from one to the other of which an electric current is passed through the said wire or strip, and between which the latter is heated, as set forth.

3. The combination, in wire-drawing, of the elastic bars *a* and *b*, connected to a battery, with the rod Z.

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

JOSEPH H. WARRINGTON.

Witnesses:
HUBERT HOWSON,
HARRY SMITH.