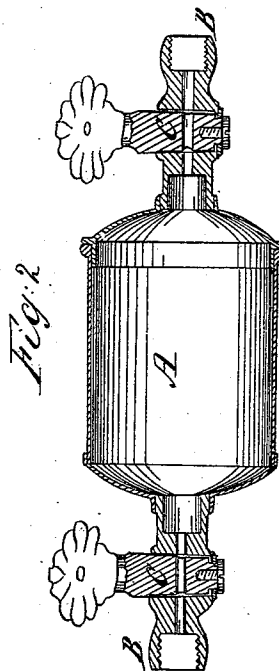
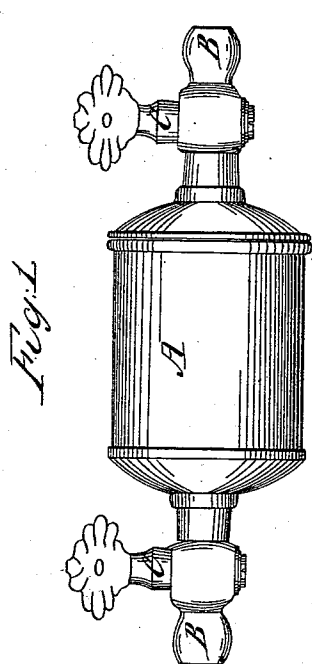


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Annealing Wire,*

*N<sup>o</sup> 36,628.*

*Patented Oct. 7, 1862.*



*Witnesses  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN ANNEALING IRON AND STEEL WIRE, &c.

Specification forming part of Letters Patent No. 36,628, dated October 7, 1862.

*To all whom it may concern:*

Be it known that I, GEORGE I. WASHBURN, of Worcester, in the county of Worcester and State of Massachusetts, have discovered a new and useful Method of Annealing Iron or Steel Wire and other Articles; and I do hereby declare the following to be a full, clear, and exact description of the manner of doing the same, reference being had, by way of illustration, to the accompanying drawings, in which—

Figure 1 represents a side view of a pot or vessel furnished with pipes and stop-cocks, and Fig. 2 represents a longitudinal, vertical, and central section through the same.

In the process of drawing, wire becomes brittle, and requires to be annealed several times, according to the degree of fineness to which it is drawn. As at present practiced, this is done by hermetically sealing the wire in a cast-iron pot, and then subjecting it to a very high heat; but though the external air may be perfectly excluded, still that which was inclosed with the wire contains oxygen enough to form a "scale" or thick oxide upon the wire which has to be removed by sulphuric or other acid, and this acid injures the metal of which the wire is made.

The object and purpose of my invention is to anneal wire in such a manner as that it shall not be oxidized or "scaled," and hence not required to be subjected to the acid bath, which injures the wire; and the nature of my invention consists in annealing wire in an atmosphere of carbonic oxide or nitrogen, or any other substance or gas, which shall not give up to the iron of which the wire is composed any or very little oxygen, and hence not require the use of acid in its removal.

To enable others skilled in the art to use my invention, I will proceed to describe the same in connection with the drawings by way of illustration.

A may represent a cast-iron pot or vessel for containing the wire that is to be annealed. This pot or vessel is furnished with pipes B and cocks C, so that a current or charge of gas or air may be admitted to the interior of said vessel in such regulated quantities as the special circumstances of the case may require. The wire having been placed in the pot or vessel and hermetically sealed, it is subjected to the proper degree of heat, and at the same

time carbonic-oxide or nitrogen gas is allowed to flow in or through the pot; or it may be forced in or through the pot and the wire it contains. I mention carbonic oxide or nitrogen because they give up none or very little oxygen to the metal, and hence do not form a scale on the wire. Any other gas or substance that will not oxidize the metal sufficiently to form a scale will answer the purpose, and I would regard such other gases and substances as have the non-oxidizing properties of those named to be included in my invention.

Some of the wire of commerce requires to be "blued," and when such wire is being annealed some atmospheric air may be introduced into the pot; but it must be in such regulated quantities as that it shall only "blue" the metal, but not oxidize it; or, instead of atmospheric air, some oxygen may be introduced, but the quantity must be under the control of the operator, and only sufficient to blue without oxidizing the wire; or, it may be a mixture of gases that will enable the operator to control the degree of oxidation of the iron or steel which is being annealed in said gas or gases, or to altogether prevent oxidation of said iron or steel as may be required, but in no event to so oxidize the metal as to require its subjection to acid of any kind to remove the scale.

When the wire is sealed up in the pot it is, of course, in the presence of atmospheric air, but this contained air may be driven or drawn out and some non-oxidizing gas made to take its place before the pot and wire are heated up to the annealing temperature.

Among the advantages of this process of annealing wire I may mention, first, the avoiding of the ill effects and the expense of acid as heretofore used; second, the facility with which I can remove one pot from the furnace and insert another without lowering the fire in the furnace, this being quite as easily accomplished with the pots I use as with those in which atmospheric air is inclosed with the wire.

The stop-cocks C afford a means of allowing the gas to be admitted or retained in the pots in such quantities or proportions as will accomplish the object without allowing oxidation to go on. The gas it will be perceived is not generated in the annealing-pot, but elsewhere, and a vacuum may easily be had in the

pot, and although I have only mentioned wire as the article to be annealed, any other article may be annealed therein.

Having thus fully described my invention, what I claim therein as new in the process of annealing wire or other articles is—

The use of such an artificial atmosphere, or gas, or mixture of gases in the annealing pot

or vessel as will enable me to control the degree of oxidation of the iron or steel being annealed, or to prevent oxidation entirely, substantially in the manner herein described.

GEORGE I. WASHBURN.

Witnesses:

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