UNITED STATES PATENT OFFICE.

BENJAMIN F. AIKEN, JR., OF MILLBURY, ASSIGNOR OF ONE-HALF TO CHARLES W. NEWHALL, JR., OF WORCESTER, MASS.

WIRE OR METAL CLEANING BATH.

SPECIFICATION forming part of Letters Patent No. 288,150, dated November 6, 1883.

Application filed April 3, 1883. (No specimens.)

To all whom it may concern:

Be it known that I, BENJAMIN F. AIKEN, Jr., a citizen of the United States, residing at Millbury, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Wire and Metal Cleaning Baths, of which the following is a specification, containing such a full, clear, and exact description as will enable any one skilled in the art to use the same.

My improved cleaning-bath may be used for cleaning metallic surfaces of oxides or foreign substances; but it is especially adapted to and valuable for cleaning wire or wire rods, either preparatory to their being drawn or preparatory to their being coated with zinc, tin, copper, or other metal, or for other purposes.

In the successive processes of drawing wire the iron becomes fibrous and requires to be annealed to render it ductile, and in the operation of annealing its surface becomes more or less covered with an oxide scale, which must be removed before the operation of drawing can be continued. This is commonly done by immersing the wire in a hot bath of diluted sulphuric acid for a short time, and then checking the action of the acid upon the metal, or "devitriolizing" it, by immersing the wire in a bath of hot water or subjecting it to a current of cold water; otherwise the excessive action of the acid bath would render the wire brittle and unfit to be drawn. The wire or wire rods are then coated or covered with a paste of meal or flour, clay, or a solution of salt or of lime, or of salt and lime, either alone or in connection with oil or fatty substances, which act as lubricants to the surface of the wire as it passes through the die-plates.

I use, instead of the bath of dilute sulphuric acid above mentioned, a bath formed by adding to water a cleaning corrosive acid. In case the wire is to be drawn I use sulphuric acid. In other cases—such as when coating with zinc or tin—hydrochloric or nitromuriatic acid may be used, and to the acid and water I add cyanogen, generally and for convenience in the form of a metallic cyanide. In practice I prefer the cyanide of potassium, and to each gallon of water I use from one to eight ounces of sulphuric acid, and from one-eighth of an ounce to one ounce of the cyanide of potassium. The condition and size of the wire and other varying circumstances render it impossible to state the exact strength of the bath required or the exact proportion of the several ingredients suitable under all the varying conditions of use; but these can be readily ascertained and determined by any one skilled in the art as the occasion demands.

By the combination, with an acid cleaning-bath, of cyanogen in the form of a soluble metallic cyanide I increase the efficiency of the acid bath and effect a great saving in the cost of cleaning. I also obviate to a considerable extent the injurious results of the excessive action of the sulphuric-acid bath in rendering the iron brittle, arising either from the absorption of free hydrogen or from other causes. A coating of ferro-cyanide is also formed upon the surface of the wire, which in some cases may enable it to be drawn one or more times without the use of the flour, clay, salt, or lime coating commonly employed, and in case such a coating is used the ferro-cyanide coating formed in the bath will aid in the lubrication of the wire.

The employment of a ferro-cyanide coating or covering as a "lubricant" in the process of wire-drawing, although considered new and useful, I do not herein claim, deeming it advisable to make such a use the subject of a separate application.

I apply heat to the cleaning-bath by either heating it in a kettle or by introducing a steam-jet, or by any known and convenient method. If, however, a steam-jet is used, the bath will undergo a constant dilution, owing to the condensation of the steam, which may be easily provided for, as is now done in the case of the sulphuric-acid bath. After the immersion of the wire a sufficient length of time, which will vary according to the condition and size of the wire, I check the action of the bath by subjecting the wire to a current of cold water, or by the use of any of the known means for the purpose. In some cases the bath may preferably be used cold.

For greater convenience in using the cleaning-bath herein described, I prefer, instead of employing the several ingredients separately,

to use a solution of the acid and the cyanide, which will then only require the proper dilution with water to render it adaptable for use.

I am aware that a solution of the cyanide of potassium has been long in use as a menstruum or solvent solution for various metals in the process of electro-deposition. Such an application I do not claim; but

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

1. The improved wire or metal cleaning bath herein described, consisting of a mixture, with a sulphuric-acid bath, of the cyanide of potassium, as described, and for the purpose set forth.

2. The improved wire or metal cleaning bath herein described, consisting of a mixture, with a sulphuric-acid bath, of a soluble metallic cyanide, as described, and for the purpose set forth.

3. The improved wire or metal cleaning bath herein described, consisting of a mixture, with a suitable acid cleaning-bath, of a soluble metallic cyanide, as described, and for the purpose set forth.

BENJ. F. AIKEN, JR.

Witnesses:
R. B. FOWLER,
MIRICK H. COWDIN.