

# UNITED STATES PATENT OFFICE.

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## PROCESS OF DRAWING WIRE.

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*To all whom it may concern:*

Be it known that we, CHARLES S. HALL, ADDISON B. CLEMENCE, and H. F. AUGUST SETTERWALL, all of the city and county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in the Art or Process of Cleaning, Coating, and Reducing Wire Rods or Wire, of which the following is a full, clear, and exact description, enabling others skilled in the art to which it appertains to make and use the same.

Our invention relates to the application of a peculiar anti-friction coating or lubricant to the surface of wire rods or wire after the cleaning, and prior to the reducing operation, to facilitate said reduction in size; and it consists in cleaning the wire rods or wire in the usual way, then coating with either metallic lead alone, deposited from a solution, or metallic lead and lime, meal, flour, or other suitable and well-known lubricants or anti-friction materials, and finally reducing by drawing or other well-known means.

Prior to our invention the various coatings and combinations of coatings used upon wire rods and wire have not given perfect satisfaction for various well-known reasons, one of the principal objections being that said old coatings, so far as we know, do not prevent oxidation of the metal when exposed to the weather and atmospheric action, some of said old coatings even tending to hasten rather than retard the corroding process. Other objections to the old coatings are that they are not of a sufficiently adhesive and lubricating nature to produce good, smooth, perfectly-coated wire without necessitating numerous unnecessary repetitions of the cleaning, annealing, coating, and reducing operations in reducing from a wire rod to the smaller sizes of wire.

It has heretofore been considered that good results are obtained by the use of old coatings, conceded to be the best, if on an average a reduction of six sizes by four drafts is obtained, resulting in good, uniformly-smooth wire. The aforesaid result, it will be understood, is obtained only when the very best of coatings are used and under the most favorable circumstances. Even these coatings are

objectionable, not only for the reason that the several operations before described are necessitated at frequent intervals to reduce the wire to the required sizes, but also for the reason that they protect said wire from corrosion only in a very slight degree, which all purchasers and users of such wire will affirm. These objections, and especially the latter, have been a source of constant study to obviate by manufacturers and others interested in the manufacture of wire rods and wire, but up to the date of our invention no better results, to our knowledge, have been produced than hereinbefore described.

We have thoroughly tested the practicality of our invention in treating several thousand pounds of wire rods and wire, and find that upon an average we can reduce the metal eight sizes by six drafts, leaving it at completion perfectly smooth and evenly coated throughout. At this stage in the reducing process the metal becomes too brittle to be further reduced with safety, although considerable of the coating still adheres to its surface, and might, but for the above reason, be reduced several sizes smaller, and still leave a sufficient amount of the coating upon the surface of the wire to protect it from the weather for a much longer period than any other known coatings used for a similar purpose.

In treating wire rods and wire by our improved process they are first thoroughly cleaned, either chemically by means of any of the well-known acids used for that purpose or by any of the mechanical means usually employed. It is next rinsed off with water applied in any suitable and convenient manner. A partial coating of metallic lead is then applied by immersion in a solution of a compound of lead, (preferably the acetate or sugar of lead,) water, and acetic acid (if the acetate of lead is used) to acid reaction, the proportions of which are necessarily varied, as will be well understood, according to the nature of the material dealt with and the character of the final product desired to be obtained, the duration of immersion also, of course, governing the degree of strength required to properly coat the wire—as for instance, if it is desirable to coat a certain class of wire by



a short immersion, then the solution must be correspondingly strengthened in order that a proper amount of coating may be deposited on the wire to carry it through the reducing process, and vice versa, for a longer immersion.

We have found in practice that the following proportions have proven the most satisfactory in ordinary cases, viz: one pound of the acetate of lead to one gallon of water, and sufficient acetic acid to acid reaction, to produce a proper adhesion of the lead to the surface of the wire. By the use of the aforesaid proportions in a hot solution we find that an immersion of about four minutes is required to deposit the proper amount of lead upon the surface of the metal.

The aforesaid solution may be used either hot or cold, as desired. We prefer, however, to use it hot, as the deposition of the lead upon the wire is much more rapid when in the latter state.

After the partial coating of lead has been applied to the wire rods or wire as before described they are then coated over the lead coating with lime, meal, flour, or any of the well-known coatings in common use. Said wire rods or wire are now ready to be drawn or otherwise reduced in size, which operation may be performed by any of the ordinary and well-known means in the usual manner.

We find in practice that a better and more highly polished finish is produced upon the surface of the wire rods or wire by the use of only the lead coating to carry it through the reducing process; but as it is a much more expensive method we prefer to use only a partial coating of lead, with a secondary coating of any common lubricant, as before described, the product being by the last method of sufficiently good quality of finish for all practical purposes, and much cheaper, as before stated. We have also ascertained in practice that but little if any difference in quality is apparent between the single or double coating, so far as relates to the reducing process, either one being sufficient to carry said process to the reducing limit of the metal being treated, and still leave sufficient lead adhering to the surface of the wire to protect it from corrosion, as before described.

The second coating serves the purpose nearly or quite as well as the lead in the first stages of the reducing process, and having the latter underneath to impart a polish and to protect the finished product it will be seen that the result produced is about the same by the use of either the lead alone or the double coating described, the only difference being that by

the use of lead alone an improvement in the smoothness and polish is produced.

If the wire is to be reduced only a few sizes, we should in all cases use only the lead coating, for the reason that in such a case only a trifle more of the coating is required than for imparting a finish to the wire and to protect it from corrosion, thus making it inadvisable to apply the second coating, as will be obviously seen. We therefore do not limit ourselves to the use of only the double coating, as the lead coating used alone is quite as essential in carrying out our improved process as the same used with other lubricants applied over the same as before described. Neither do we limit ourselves to the use of the acetate or sugar of lead to obtain a metallic deposit by immersion in a solution, as sulphate of lead and other compounds of lead may be used for the same purpose, if preferred, by using their corresponding acids to acid reaction.

In practice we prefer the acetate of lead compound, as a metallic deposit is more quickly precipitated by its use than by any of the other salts or compounds of lead.

We are aware that the use of lead as a coating for metals is not new, and therefore make no claim in a broad sense to its use, our claim being limited to the use of lead applied in metallic form on wire rods or wire in combination with the process of cleaning and reducing said wire rods or wire in carrying out our improved process hereinbefore described.

Having described our improvements in the art or process of cleaning, coating, and reducing wire rods or wire, what we claim therein as new and of our invention, and desire to secure by Letters Patent, is—

1. As an improvement in the art of making wire, the same consisting in first cleaning the wire, then coating with lead by immersion in a bath of acetate of lead, acetic acid, and water, finally reducing by drawing or otherwise, substantially as described.

2 As an improvement in the art of making wire, consisting in first cleansing the wire, then coating with lead by immersion in a bath of acetate of lead, acetic acid, and water, then coating with flour, meal, or any well-known anti-friction lubricant, finally reducing by drawing or otherwise, substantially as described.

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Witnesses:

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