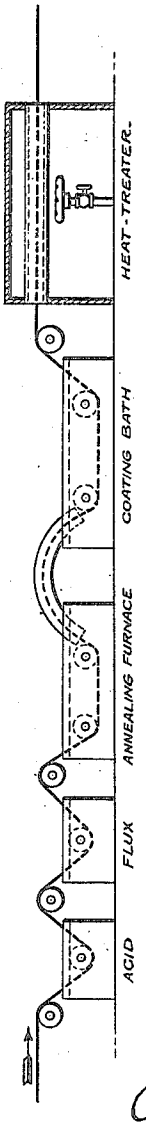
J. L. HERMAN.

PROCESS OF COATING AND TREATING MATERIALS HAVING AN IRON BASE.

APPLICATION FILED MAR. 6, 1922.

1,430,651. Patented Oct. 3, 1922.



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UNITED STATES PATENT OFFICE.

JOSEPH L. HERMAN, OF PEORIA, ILLINOIS.

PROCESS OF COATING AND TREATING MATERIALS HAVING AN IRON BASE.

Application filed March 6, 1922. Serial No. 541,563.

To all whom it may concern:

Be it known that I, JOSEPH L. HERMAN, a citizen of the United States, a resident of Peoria, in the county of Peoria and State of Illinois, have invented new and useful Improvements in Processes of Coating and Treating Materials Having an Iron Base, of which the following is a specification.

This invention has reference to a process of coating and treating materials having an iron base, and particularly the coating and treatment of wire used in the fence industry and for telephone and other purposes.

The principal object of this invention is to subject the material to an annealing process and then without allowing the annealed material to come into contact with air subjecting the same to a coating bath and finally subjecting the coated material to a heat-treatment.

Such heat-treatment has for its object an improved coating which will be more resistant to atmospheric, rusting and corroding conditions than is ordinary galvanized wire, and which further will permit a heavier coated wire to be used in wire fabricating machines, without causing the coating to crack or flake off as in the case with heavily coated galvanized wire coated by ordinary processes; the annealing of the material being for the usual softening purposes.

A further object of the invention is to permit the use of higher speeds for galvanizing wire than can be used under the ordinary galvanizing processes where heavier coatings are desired and at the same time causing a heavier coating to be formed on the wire.

This application is a companion to applications for patent filed by me of even date herewith bearing Serial Nos. 541,561 and 541,562 and the application for patent filed by me on February 10, 1922, bearing Serial Number 535,660, all directed towards processes for coating and treating materials having an iron base. The invention herein described differs from those disclosed in said pending applications, in that the material is annealed and then coated without allowing said material to come into contact with air.

Galvanized wire which is to be used for fabricating purposes and more particularly that which is to be used in the manufacture of woven wire fencing must have a relatively heavy coating of spelter in order to be able to withstand atmospheric corroding conditions, and before my invention was developed this was not possible except at a much increased cost of production.

The universal practice for testing the relative value of spelter on galvanized wire is by the so-called Preece or copper sulfate test. There are other tests, however, which are used for quantitatively determining the amount of spelter on galvanized wire, such as stripping the coating in caustic soda solution; in a suitable hydrochloric acid solution; in a solution of hydrochloric acid and antimony chloride, and in a lead acetate solution. The copper sulfate test, although not strictly quantitative, is comparative when used under known conditions of temperature and strength, and being a quick test, and one which can be performed by any one after a little experience, has come to be the routine testing medium for galvanized wire coatings.

At the present time there are only two (2) methods in use whereby these necessary heavy zinc (spelter) coatings may be obtained by the hot process of galvanizing. The first method is to pass the wire very slowly as it emerges from the galvanizing bath, through finely divided charcoal. By such a process a smooth, thick coating may be obtained. This method is used for making telephone wire. It has serious drawbacks, however, from an economic standpoint, because the wire must travel at a very slow speed, a very high grade zinc must be used, and, furthermore, the coated wire cannot be subjected to the action of wire-fence fabricating machines without having considerable of the zinc coating crack or flake off the iron base. The second method is to cause the wire to travel at relatively slow speeds, through a bath of molten spelter, the speed depending on the gauge of wire, the thickness of coating desired and the length of the molten spelter bath, and then wiping the wire by passing it between suitable wipers. In other words, a wire will have a heavier galvanized coating, as measured by the copper sulfate test, the longer it remains in the molten spelter. This latter process, too, has its economic drawbacks, because of the slow speeds required, the long spelter pans necessary and

consequently the lessening of the tonnage passing through a galvanizing unit in a given time.

In the accompanying drawing there is illustrated diagrammatically the usual or ordinary continuous galvanizing or coating apparatus, except that the annealing furnace is not placed as it is ordinarily but which is placed adjacent the coating bath, and includes "acid" bath, "flux" bath, "annealing" furnace, "coating" bath and "heat-treater." The annealing furnace is shown in relation to the coating bath so that wire may enter the coating bath from the annealing furnace at a high temperature without coming into contact with the air. In the illustration I show this by means of a tube sealed from the air at both ends by being submerged below the surface of the lead in the annealing furnace and below the spelter or other metal of the coating bath. When the tube is heated all the oxygen in the confined air is soon used up and both ends being sealed no more air can enter so long as the heat is maintained.

I have discovered that if the material is subjected to an annealing temperature and then without allowing the annealed material to come into contact with air is subjected to a molten coating bath, I obtain a heavily coated material.

If this material is then subjected to a heat-treatment such as I have disclosed in said copending application bearing Serial Number 535,660 I have a coated product superior to that which can be obtained by ordinary galvanizing processes.

I realize that annealing per se is not new and also realize that coating is not new, but the process by which I perform these operations and which I have described is new, and results in producing a coated wire superior to any which can be produced by ordinary coating processes except in the case of heavy wires where long spelter pans are utilized and where relatively slow speeds are used.

I also realize that the annealing temperature will vary for different carbon contents, or kinds of wire, or whether the annealing is to relieve the strain of "bench hardening" that comes from the cold working of the wire, or whether from some other source, as I have stated in my companion application bearing Serial Number 541,561. By "annealing" I refer to softening and by "heat-treatment" I have reference to such treatment as will produce a physical or chemical change of the material undergoing treatment, such as I have disclosed in my copending application bearing Serial Number 535,660.

For example, I have taken a "bench hardened" 0.12% carbon No. 12 gauge wire and passed it through a bath of molten lead heated to a temperature of about 1250° F. for a period of about seven seconds and then without allowing the annealed wire to come into contact with air and preferably while still in a heated condition, immersing the same in molten spelter at a temperature of about 1200° F. for a period of about three seconds and then passing the same through a tube heated to a temperature of about 1250° F. I then have an annealed product which not only has a smooth even coating but a coating which will also stand approximately four or more one minute immersions in copper sulfate.

It is well known to those skilled in the art that an oxidized wire cannot be suitably coated and it is for this reason that I do not permit the heated annealed wire to come into contact with the air before immersing it in the coating bath. In ordinary processes it is necessary to remove this oxide by means of acid or some other suitable cleansing medium before subjecting the material to the coating bath. And furthermore I have found that I get an improved bonding action between the material and the coating when I pass the material while in a heated state into the molten coating bath.

In my companion application bearing Serial Number 535,660 I have disclosed the heat-treating of coated materials having an iron base, such for instance as coated wire, after the coating step, and of material which is annealed in any well known manner prior to the coating thereof. In this application I claim the annealing of the material and then coating it without allowing the same to come in contact with the air and in a coating bath maintained at a high temperature, say about 1300 degrees F. I have found that with this process of coating I get very good results with larger gauges of wires, such as No. 9, and create an effective bonding action between the coating and the base material; however, such bonding action is not as effective in the case of smaller gauges of wire, such as No. 14, because the small body does not retain a sufficient amount of heat to be as effective as the larger bodies and therefore the subsequent heat-treatment is desirable and is employed for the purpose of accomplishing similar results as that disclosed by the use of the heat-treater in my companion application bearing Serial Number 535,660.

I do not wish to limit myself to the temperatures and periods of time given above as I have clearly stated and shown in my copending application bearing Serial No. 535,660 that times, speeds, and gauges of wire may be utilized in a multitude of combinations without departing from the spirit and scope of the invention.

What I claim is:

1. The process of galvanizing wire, which

consists in continuously moving the wire and during such movement subjecting the same, first—to an annealing action and then without allowing the annealed wire to come into contact with air and while maintaining the wire at approximately the annealing temperature subjecting the same to a coating bath.

2. The process of galvanizing wire, which consists in continuously moving the wire and during such movement subjecting the same, first—to an annealing action and then without allowing the annealed wire to come into contact with air subjecting the same to a coating bath and finally heat-treating said annealed and coated wire.

3. The process of treating un-annealed materials having an iron base which consists in subjecting the same, first—to an annealing action and then without allowing the annealed material to come into contact with air and while maintaining the material at approximately the annealing temperature subjecting the same to a coating bath.

4. The process of treating un-annealed materials having an iron base which consists in subjecting the same, first—to an annealing action and then without allowing the annealed material to come into contact with air subjecting the same to a coating bath, and finally heat-treating said annealed and coated material.

5. The process of galvanizing wire, which consists in continuously moving the wire and during such movement subjecting the same, first—to an annealing action and then while maintaining the wire at approximately the annealing temperature subjecting said wire to a coating bath.

6. The process of treating un-annealed materials having an iron base which consists in subjecting the same, first—to an annealing action and then while maintaining the material at approximately the annealing temperature subjecting said material to a coating bath.

In witness whereof, I have hereunto affixed my hand and seal this 4th day of March, 1922.

JOSEPH L. HERMAN. [L. S.]