

UNITED STATES PATENT OFFICE.

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PLATED METAL AND PROCESS OF MAKING THE SAME.

942,803.

Specification of Letters Patent.

Patented Dec. 7, 1909.

No Drawing.

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To all whom it may concern:

Be it known that I, JOHN WILDER, a citizen of the United States, residing at Conneltsville, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Plated Metals and Processes of Making the Same, of which the following is a specification.

As is well known, galvanized sheet or wire of iron and steel, though of great value and used in immense quantities in the industrial arts, have several serious defects. Among these are the variations of a proper thickness and homogeneous coating, its brittleness, the weakness of its attachment to its base of iron or steel, its liability to be detached by the rusting of the base beneath it, its tendency to crack and flake when the sheet or wire is bent at a sharp angle or doubled back, its liability to be detached from its base and destroyed by expansion and contraction due to heat and cold, and its inability to resist the corrosive action of sulfur and gases usually present as impurities in the air near manufacturing plants and large cities.

The objects of my invention are first to provide an article of plated sheet or wire of iron or steel which while possessing the virtues of galvanized iron and steel sheet or wire, will be free from the defects above pointed out, and at the same time cheap enough for it to compete with and displace them for all purposes for which they have heretofore been used; second, to manufacture a metallic coated wire having a smooth uniform, flexible, silver-like and non-corrodible coating which has a longer life and resists exposure when used for fences, and a higher rate of conductivity, and needs less repairs and cost of installation when used for electrical purposes than wire heretofore made for the same purposes; and, third, to provide a process for producing the above referred to and desired products.

In manufacturing my improved sheet or wire metal, I preferably proceed in the manner hereinafter described: For the coating, I prepare an alloy whose preferred composition is substantially as follows:—seventy-

eight per cent. by weight of spelter or zinc, one and one-half per cent. by weight of copper, seven per cent. by weight of aluminium and thirteen and one-half per cent. by weight of tin. While the foregoing proportions have been found best by experiment, I do not care to limit myself to all of the foregoing metals or the stated proportions, as they may be varied in several ways without departing from the necessary features and spirit of my invention.

I have found that in order to obtain a thorough and homogeneous bath or mixture of the above stated metals comprising the preferred form of my alloy, and more especially the thorough commingling of the copper and aluminium, I proceed by first melting the required weight of tin and bringing it to the necessary and desired heat. I then mix with the melted tin the copper, which has been previously rolled down to thin plates, which plates are gradually and slowly fed into the melted tin and taken up by the same. This mixture of tin and copper is continuously stirred for at least four hours and the copper will be completely absorbed by the tin and the skimmings which are formed may be removed from time to time. After the copper has been taken up, I add the required amount of metallic zinc or spelter, which is likewise thoroughly stirred for four hours and the zinc or spelter will completely absorb the above mixture of molten tin and copper. I then add the necessary metallic aluminium, more or less as conditions require, and the mixture is then stirred for at least twelve hours, so that the above metals will all be completely united or alloyed and the impurities worked out and removed in the skimmings.

The alloy above described may be applied as a coating to either iron or steel sheet or wire, but in the manufacture of plated sheets, I prefer to use sheet steel as a base.

Before introducing the sheets, wire or other articles into the molten bath, they should be thoroughly cleansed, preferably in a suitable pickle, after the manner usual in galvanizing. If the sheets, wire or other articles have any acid or other fluid adhering

to them when withdrawn from the pickle, it should preferably be thoroughly removed before they are immersed in the molten bath. The sheets, wire or other articles when coated should preferably be perfectly free from either rust or acid. After cleansing the sheets, wire or other articles, they should have a suitable flux applied to their surfaces, and any of the fluxes used by tin plates will answer, and in a manner similar to that of galvanizing wire or steel, or any other way known in the art of plating sheet iron or steel. After receiving a suitable flux, the sheets, wire or other articles to be coated may be introduced into the molten bath or alloy, and withdrawn therefrom according to any of the methods now in use in galvanizing or in any other suitable manner. Where either iron or steel is treated in this way, the heat of the bath thoroughly and completely alloys that portion of the coating next to the base with the metal of the base, though at its own surface the coating appears to be composed solely of the alloy used as a bath. The union between the coating and the iron and steel is perfect and cannot be affected either by expansion, contraction or bending. The coating is as flexible as the coated base and so tough and tenacious that wire or sheet steel or iron can be worked up into articles of manufacture or electro-welded as well after coating as before, in which it differs radically from ordinary galvanized iron or steel which, as is well known, are usually coated with zinc after they are made.

My improved coating is far superior to prior coatings in both texture and appearance. The texture of the preferred form of alloy or coating is fine grain which allows it to thoroughly and deeply enter the fine and expanded pores of the heated iron or steel, become fully alloyed with the same as if riveted thereto with innumerable and infinitesimal rivets, and thereby highly tenacious. The coating is also smooth, uniform in thickness and homogeneous in texture and in appearance resembles a silver finish.

For roofing, gas furnaces, and all other industrial and architectural sheet metal work, my sheets have been found superior to any other plated sheet metal with which I am acquainted.

My invention is more especially adapted and was primarily evolved for the purpose of plating steel and iron wire to be used for electrical purposes, and where subjected to the action of the elements as in telegraphy and fences.

After complete and careful experiments and tests it has been found that an iron or steel wire treated by my invention is an excellent and superior conductor of electricity, and at the same time is rust proof, can be electrically welded, heated to a red heat,

tied into a knot without starting or detaching the coating and also resists the U. S. Government and Western Union Telegraph Company tests, twice as long as any other coated iron or steel wire.

My new process differs both in the mixture and the heat from the old and prior processes, the use of copper being a departure, and by its use I am enabled to use a larger percentage of aluminium. I have also found by the presence of copper that my process is better adapted for wire, as I can apply a heavier coating and still preserve great tenaciousness. The copper appears to have a great affinity, absorbing or alloying properties for the aluminium and keeps it from too readily separating as has been found to be the case in prior and similar processes where aluminium is used, also preventing and entirely eliminating the formation of dross or refuse metal, which is a great saving and reduces the cost of production of plated metal when the herein described method is employed.

It has been found by experience that in ordinary galvanizing processes, only twenty-five per cent. of the molten bath attaches itself to the wire, while with my improved process at least seventy-five per cent. is made to permanently alloy itself with the wire.

I prefer the bath to contain the above-named percentages and to be used at a temperature from 800 to 850° F.; if more than the above percentages are used, the bath will be required to be kept at a higher temperature, which is dangerous to the copper, aluminium and the tank.

In regard to the quantities of metal used it will be noted that I have stated the preferred quantities, but it will be understood that the proportions can be widely varied, also the tin can be omitted without the essential and important alloying characteristics of the copper and aluminium above explained being changed.

What I claim as new and desire to secure by Letters Patent is as follows:

1. As a new manufacture, iron or steel having a coating of an alloy containing aluminium, copper and zinc.

2. As a new manufacture, iron or steel having a coating of an alloy containing aluminium, copper and tin.

3. As a new manufacture, iron or steel having a coating of an alloy containing aluminium, copper, tin and zinc.

4. The process of coating iron or steel consisting in preparing a molten bath of an alloy containing aluminium, copper and zinc; cleansing and drying the iron or steel; and introducing the iron or steel into and withdrawing it from the molten bath.

5. The process of coating iron or steel consisting in preparing a molten bath of an

alloy containing aluminium, copper and tin;
cleansing and drying the iron or steel; and
introducing the iron or steel into and with-
drawing it from the molten bath.

5 6. The process of coating iron or steel
consisting in preparing a molten bath of an
alloy containing aluminium, copper, tin and
zinc; cleansing and drying the iron or steel;

and introducing the iron or steel into and
withdrawing it from the molten bath. 10

In testimony whereof I affix my signature
in presence of two witnesses.

JOHN WILDER.

Witnesses:

L. W. FOGG,
LEE SMITH.