

# UNITED STATES PATENT OFFICE.

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## MANUFACTURE OF GALVANIZED IRON.

SPECIFICATION forming part of Letters Patent No. 456,204, dated July 21, 1891.

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*To all whom it may concern:*

Be it known that I, JOSEPH WILLIAM RICHARDS, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Galvanized Iron, whereof the following is a specification.

My improvements relate to the process of coating iron with zinc in the manner which is commercially called "galvanizing." As is well known, the ordinary method of galvanizing sheet or other iron consists in dipping it into a bath of melted zinc and allowing it to remain until a layer of zinc of the desired thickness has been deposited thereon and adheres thereto. I have discovered that by the diffusion of a very small percentage of metallic aluminum throughout the bath of melted zinc a much more uniform deposit upon the sheet-iron can be effected, and, moreover, that, as compared with previously-known products, the coating is highly crystalline and permanently brilliant, while at the same time being exceedingly malleable and tenacious, as well as strongly adherent to the iron.

For the conduct of my process in its preferred form I proceed as follows: As the quantity of aluminum required is very small, its diffusion throughout a large bath might be found practically difficult were it used alone or in a pure form. I therefore first form an alumino-zinc alloy by melting in a suitable crucible, say, two per cent. of metallic aluminum and adding thereto ninety-eight per cent. of metallic zinc. When thoroughly combined, the alloy thus formed is cast into small bars for convenience in use. The zinc in this alloy is, however, merely a vehicle for the aluminum contained therein to permit its more ready diffusion throughout the galvanizing-bath, and said alloy is not to be understood as being a product of my process, nor is its use essential to the same. Having prepared the galvanizing-bath in the usual manner by melting a sufficient quantity of zinc, I add the alumino-zinc alloy just described thereto, preferably in the quantity of about four ounces of alloy to the ton of melted zinc in the bath, and after allowing a few minutes for diffusion of aluminum throughout the bath I dip the sheet or other iron which is to be galvanized in the ordinary manner. As

the bath is depleted and new additions of zinc are made thereto the alumino-zinc alloy should be added in the same proportions as before. I find that the crystalline formation of the deposited zinc varies with the amount of aluminum in the bath, the size of said crystals increasing (up to a certain limit) with the increased percentage of aluminum; but irrespective of the differences in degree which results from the use of a greater or less percentage of aluminum the advantageous qualities above described as incident to such use will result from the conduct of the galvanizing process in the presence of aluminum in any substantial quantity. Hence I do not limit my claim to the use of the above-mentioned proportions.

It must be understood that my invention does not necessarily involve the deposit of an alumino-zinc alloy recognizable as such in the final product, and I do not wish to be understood as limiting myself to a process which yields such an alloyed coating. Hence in using the words "alumino-galvanizing" as a convenient term to describe the process I do not intend that the coating must essentially be a recognizable alloy, but merely that it possesses the characteristics due to deposit in the presence of aluminum.

Furthermore, though I have described the use of a vehicle or primary alloy of aluminum and zinc as the best method known to me of diffusing the aluminum throughout the galvanizing-bath, I do not mean to restrict my claim to the use of a vehicle for this purpose, since any method of addition which effectually diffuses the metallic aluminum throughout the bath would be the equivalent of the described process.

I claim—

The hereinbefore-described process of alumino-galvanizing iron, which consists in diffusing metallic aluminum throughout a bath of metallic zinc and then dipping the iron in said composite bath and permitting the coating to deposit thereon, substantially as set forth.

JOSEPH WILLIAM RICHARDS.

Witnesses:

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