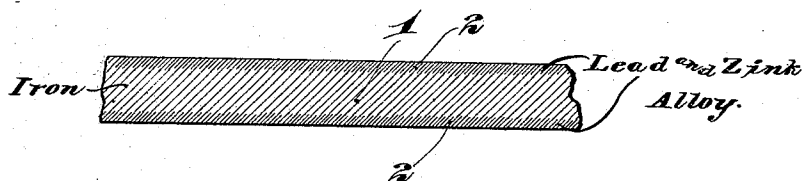


G. A. GOODSON.
PLATED METALLIC BODY.
APPLICATION FILED MAR. 11, 1907.

1,061,066.

Patented May 6, 1913.



Witnesses;
Geo. Knutson
H. L. Opsahl.

Inventor;
George A. Goodson
By his Attorneys;
William M. Merchant

UNITED STATES PATENT OFFICE.

GEORGE A. GOODSON, OF MINNEAPOLIS, MINNESOTA.

PLATED METALLIC BODY.

1,061,066.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed March 11, 1907. Serial No. 361,829.

To all whom it may concern:

Be it known that I, GEORGE A. GOODSON, a subject of the King of Great Britain, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Plated Metallic Bodies; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide a plated metallic body which will be efficient to resist corrosion under the action of the elements to which said product is naturally exposed in use.

To this end, my invention consists of a plated metallic body having the characteristic features hereinafter described and pointed out in the claim.

Iron, using this term in its broadest sense, so as to include steel, and all similar metals, is the body primarily intended to be plated, but the invention may be realized, possibly, with other metal as the body to be plated. The body to be plated may be in the form or shape of sheet metal, wire, rods, or any other of the manifold forms ordinarily taken by iron and steel for commercial use. Iron plated with tin is commercially known as tin-plate; iron coated with an alloy of tin and lead is known as terne-plate; and iron coated with zinc is known as galvanized iron. This improved product has been commercially produced by the process disclosed and broadly claimed in my United States re-issued Patent, No. 12,779, of date April 14, 1908.

Considered as platings for iron, all the above noted plating metals have some good qualities and some bad qualities; but none of the good qualities are common to all and none of the bad qualities are common to all. What is good in one is lacking in another. No plating metal is good unless it will resist the elements to which the plated body is necessarily exposed in use; and none is good unless it is electro-positive in respect to the body plated thereby. Prior to my invention herein disclosed, no plated body existed, so far as I know, having these two essential qualities combined.

It is well known, in electro-metallurgy, that different metals exhibit a difference in

electric potential with respect to one another, when connected together under proper conditions to develop galvanic action. In other words, all the different metals are, to some extent, positive or negative with respect to one another, and the tendency of the galvanic action is to decompose the positive element only.

With reference to iron,—tin, lead and the alloys of tin and lead, are electro-negative; and zinc is electro-positive. The negative group of plating metals, above noted, particularly lead, have great power to resist the action of the acids and other elements found in the atmosphere and in water. Commercially, however, it has been found impracticable to apply plating metals to iron in such a way as to make an absolutely perfect covering of the iron. It has been found, in practice, that, ordinarily, there will be left more or less minute uncovered spots of the iron which, commercially, are called pin holes. Because of this imperfect covering, or the presence of these minute pin holes, if iron be plated with any of the negative group of plating metals above noted, an adverse galvanic action will take place between the iron and the coating metal, when the product is exposed to the elements, as it naturally is, in use. The bare or exposed iron, under the effect thereon of the acids in the atmosphere or water, or from other sources, will corrode or rust; and this corrosion or rusting will be greatly intensified, at these uncovered spots or pin holes, by the adverse galvanic action, and this intensified decomposition of the iron, or rusting action, will be made quickly manifest by the deposition of the rust over large areas of the plating metal. For the above stated reasons, iron coated with said negative metals, is not durable, in service, unless painted. This is a well known and generally recognized fact.

Zinc is highly positive to iron; and, for this reason, the galvanic action set up is favorable and protective to the iron; and, iron coated with zinc, although exposed to the elements, by the presence of pin holes, the result of imperfect coating, will not corrode so long as there is any of the zinc left. Zinc has a natural affinity for iron and hence adheres well to the iron; and because of the said several reasons, above noted, has been extensively used for coating iron.

Zinc, however, will not withstand the action of acids, but is rapidly eaten up thereby; and, hence, a thin coating of zinc will not last long. Zinc must be applied to the iron in a comparatively thin coating; or, otherwise, it will scale off, because of the brittleness of the zinc. For these reasons, iron coated with zinc is shortlived under the exposure incidental to use.

I have made discoveries which have led me to employ, for the plating metal, an alloy having as its base or chief component an electro-negative metal; but also containing an electro-positive metal in sufficient quantity to render the alloy electro-positive with respect to the body plated thereby. So far, I have used this alloy for plating iron or steel and find that I get a product having all the good qualities peculiar to the best of the negative metals above named, to-wit, lead, together with the essential or protective quality peculiar to the positive metals. So far, in practice, I have employed lead alone, or lead and tin together, as the base or chief component of the alloy, and put therewith sufficient zinc to render the alloy electro-positive to the iron. I have secured the best results with an alloy composed of about ninety-five per cent. of lead and five per cent. of zinc.

Attention may be here called to the fact that prior to my invention it was not deemed feasible to form an alloy of lead and zinc containing more than one and six-tenths per cent. of zinc which small percentage of zinc is not sufficient to render the alloy electro-positive to iron. In order to obtain the necessary percentage of zinc in the alloy to render the negative metal, to-wit, lead, electro-positive to iron, I find it convenient to employ the general mode of producing the coating metal described in my prior patent and application aforesaid. The electrified lead or body of molten lead, when subjected to an electric current, under the conditions specified in the patent and application aforesaid, readily alloys with percentages of zinc far in excess of those previously deemed possible and sufficient, moreover, to render the alloy electro-positive to iron, which condition I find maintains when the content of zinc in the alloy is equal to approximately three per cent., and, of course, obtains for all higher percentages of zinc. With these alloys, I have produced a product which successfully withstands the most severe humidity test and an acid test more severe than any found in actual service.

The usual or customary test for galvanized iron, is to place a piece of the same in a solution of sulfuric acid, made up of nineteen parts of water to one of acid, and leave the piece of galvanized iron immersed therein for twenty-four hours. At the end of this time, under such a test, the zinc will be found

to have entirely disappeared and the iron to be partly destroyed. My product, when subjected to this identical test, for the same length of time, is found, at the end of the test, to be perfectly intact. I have even subjected my product to this test for several days at a time, and, nevertheless, found no appreciable deterioration thereof. The test for iron coated with any of the negative group of metals, such as tin, lead, or the alloys of tin and lead, is what is known as the humidity test, with a view of determining the perfection of the covering. These negative metals do not require any test with respect to acids. The humidity test is usually afforded by a moisture laden bath in which the plated article is suspended for twenty-four hours. Ordinary terne-plate and ordinary tin-plate, suspended in such a bath, for twenty-four hours, will develop the presence or absence of pin holes, or other abrasions, through which the iron is exposed to the action of the bath. Otherwise stated, blotches of rust will be developed under the adverse galvanic action, in that short time, and be spread over the plated surface so as to be very manifest, if these pin holes or abrasions are present. Likewise, if the specimen has been cut from a larger plate, the edge will be rusted all around. My product, when subjected to such a humidity test, even though purposely scored with a sharp instrument so as to expose the iron, will not develop the slightest trace of rust, although left in the bath for a much longer time. For example, I have left specimens, scored so as to expose the iron, in such a humidity bath, for several weeks, and have found that absolutely no rust developed. This fact is due to the favorable galvanic action, and not to any extra perfection or completeness of the covering. It will be seen, therefore, that my product withstands the two crucial tests which are customarily applied, respectively to the said positive and the said negative group of plating metals. The positive group of plating metals do not require any humidity test, because the galvanic action is favorable; and, as above stated, the negative group of plating metals do not require any acid test, because their ability to withstand acids is well known.

It may seem remarkable that an alloy composed of 95% of a metal or metals, which, by themselves, are electro-negative with respect to iron, and containing only 5% of a metal, which, by itself, is electro-positive with respect to iron, should make the alloy electro-positive in respect to the iron coated thereby; but my tests completely demonstrate this to be the fact. The application of an ordinary galvanometer to specimens of this alloy and iron, in a proper bath, will show that the alloy is decidedly electro-positive in respect to the iron.

Of course, I do not limit myself to the exact proportions of the constituents of the alloy above noted. The point is to employ an alloy having as its base or chief component a large proportion of a metal or metals which is electro-negative and which alloy also contains a small proportion of an electro-positive metal in sufficient quantity to render the alloy electro-positive with respect to the body to be plated thereby.

The invention is illustrated in the accompanying drawing.

The single figure is a view in section taken through the plated metallic body.

The numeral 1 indicates the metallic body

and the numeral 2 indicates the material applied thereto.

What I claim is:

A metallic body plated with a homogeneous metal alloy containing ninety per cent. or more of lead and ten per cent. or less of zinc, the said zinc being sufficient to render said alloy electro positive in respect to the body plated thereby.

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

GEORGE A. GOODSON.

Witnesses:

JAS. F. WILLIAMSON,
M. E. RONEY.