

UNITED STATES PATENT OFFICE.

GEORGE A. GOODSON, OF MINNEAPOLIS, MINNESOTA.

PROCESS OF PLATING METALLIC BODIES.

No. 900,847.

Specification of Letters Patent.

Patented Oct. 13, 1908.

Application filed March 28, 1906. Serial No. 398,446.

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, Hennepin county, Minnesota, have invented certain new and useful Improvements in Processes of Plating 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.

In Letters Patent of the United States granted to me under date of May 9, 1905, No. 789,690, I have described a process of galvanizing, tinning, or otherwise plating wire and other metallic bodies. The fundamental feature of the process described in my said patent, and which I have claimed in an application for a reissue thereof, said application having been filed November 24, 1905, Serial No. 288,981, consists in subjecting the plating metal, while in a molten condition, to the action of an electric current, with the resultant effect that even when lead is used as the coating metal a firmly adhering non-scaling coating thereof is obtained upon the metal to be plated. In the said reissue application, I have claimed this feature broadly.

In the course of my experiments connected with the development of the process referred to, I have ascertained that the plating metal after it has been once subjected to the action of an electric current of the proper amperage and for a sufficient interval of time is adapted for the successful coating of the wire or other article to be treated, after the current has been cut off. In fact, I have ascertained that the plating metal after it has been thus subjected to the action of the electric current may be permitted to cool down so as to solidify, and may then be remelted, even by means other than the electric current and may then be applied to the wire with a product or result in the way of plating, which is still much better than I have been able to secure with plating metal which has never been subjected to the action of an electric current. It is the purpose of my present specification to cover these ancillary discoveries.

In carrying my present invention into practice, for the plating of metallic bodies, such as, for instance, wire or plates of iron or steel, I first subject the bodies to be coated, to the usual pickling operations for the removal of the surface oxidation or scale. I

then submerge the body to be plated in a molten bath of the plating metal, this submergence being obtained either by dipping (as in the case of plates and the like) or, where wire is to be plated, by causing the wire to traverse or to be drawn through the molten bath, as, for instance, by the apparatus shown in my patent above referred to, or in my patent, No. 789,691, of even date therewith.

A still more convenient way of practicing the invention is by the employment of apparatus wherein the plating metal is first subjected to the influence of the electric current, while in a molten condition, and is transferred to a second vessel or receptacle wherein it is kept in a molten condition by a gas flame, furnace fire, or the like, this second receptacle serving as the plating or coating vessel proper, *i. e.* as a dipping receptacle for plates, or as a receptacle through which wire and the like may be drawn.

The second vessel referred to may be of any suitable kind. In our actual practice, it was a large coal heated melting pot, adapted to hold several tons of plating metal and fitted for the dipping and handling of sheet metal plates in the well known standard way. The difference in our practice was simply the fact that the plating metal had first been energized by treating the same with the electric current in the electric energizing furnace, in the way and for the time hereinafter more particularly stated.

After the plating metal has been subjected to the influence of the electric current, in the manner referred to, the plating metal thus treated may be permitted to cool down, and even to solidify into a solid mass, as, for instance, into ingots. This partly solidified, solidified, or ingot metal, may then be brought to the molten condition, either by the electric current itself, or by a gas flame, a furnace fire, or other source of heat independent of the electric current, and it will be found that the remelted metal will effectively coat the metal to be plated, although no electric current is passed through the plating metal while the coating operation is proceeding.

Broadly stated, therefore, the discovery underlying my present invention, is that the plating metal is available for the successful coating of the metallic body to be plated, even though no electric current is passed through the plating metal during the prog-

ress of the plating operation, provided only that the plating metal has previously been subjected to the action of a suitable electric current for a suitable period of time. The time required to get the plating metal into the best condition varies somewhat, according to the kind of metal employed, and for other causes, but for commercial lead, or an alloy of lead and antimony (87% lead and 13% antimony), is usually about fifteen hours with the use of an energizing furnace substantially of the kind disclosed in my patent 789,215 of May 9th, 1905, hereinbefore referred to, with electrical connections adapted to afford a current of about 1300 amperes in the tube connecting the melting pots. The tube in the apparatus actually used had a cross section of one inch external diameter and three-fourths inch internal diameter or bore; and the metal was kept flowing from one metal pot to the other. More specifically, my present invention is intended to cover the further discovery that the plating metal may be made available for the production of the same result, provided it has been subjected to the action of a suitable current of electricity for a suitable period of time, even though the plating metal thus treated may have been permitted to cool down so as to solidify, thereby requiring to be remelted before it is employed in the plating or coating operation. These discoveries are of material importance from the standpoint of the convenient and economical practice of the generic invention. For instance, where a comparatively large body of plating metal is required, *i. e.* as in receptacles for dipping large plates, it would be both inconvenient and expensive to effectively subject the entire body of metal required for the purpose, to the action of an electric current sufficient to bring it all to the required condition in a single vessel. It is, therefore, preferable to make up the contents of such a dipping vessel either by melting therein, by an ordinary gas fire or the like, a sufficient number of ingots which have already been subjected to the action of the electric current, and which may come from some distant source of supply, or even where electric current is available at the place where the plating is to be carried on, it is more economical to bring the plating metal to the required condition, in a separate or smaller tube, conduit, or other receptacle, wherein smaller bodies of the metal may be successively brought to the desired condition.

In the practice of my invention, I find that a suitable current for bringing the plating metal, as, for instance, lead, or lead and antimony, to the proper condition for effective plating, or for the casting of ingots which

may thereafter be remelted, as above specified, is a current of about 1,500 to 2000 amperes, applied to a body of the molten metal of say $\frac{3}{4}$ of an inch in diameter, which current may be readily derived from the secondary circuit of a suitably proportioned transformer.

It will, of course, be understood that in the alloy of lead and antimony, the antimony plays the part of a hardening agent. It is present usually in the proportion of about 13% and in such proportion it is found not to interfere with the proper adherence of the lead to the metallic body to be plated.

What I claim and desire to secure by Letters Patent of the United States, is:—

1. The process of plating metallic bodies which consists in subjecting plating metal to an electric current while in a molten condition, discontinuing the passage of the current, and thereafter applying the plating metal to the metallic body to be plated.

2. The process of plating metallic bodies which consists in subjecting plating metal to an electric current while in a molten condition, allowing the said plating metal to solidify, and subsequently remelting said plating metal and applying the same to the metallic body to be plated.

3. The process of plating metallic bodies, which consists in subjecting lead to an electric current while in a molten condition, allowing the lead to solidify, subsequently remelting said lead and applying it to the metallic body to be plated.

4. As a new article of manufacture, a metallic body plated with a metal which has been previously subjected to an electric current while in molten condition.

5. As a new article of manufacture, a metallic body plated with lead which has been previously subjected to an electric current while in molten condition.

6. As a new article of manufacture, a body of plating metal which has been subjected to an electric current while in molten condition and allowed to solidify, whereby it has imparted to it the quality of forming an intimate union with the metal to be coated.

7. As a new article of manufacture, a body of lead for use in plating metals which has been subjected to an electric current while in molten condition and allowed to solidify, whereby it has imparted to it the quality of forming an intimate union with the metal to be coated.

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

GEORGE A. GOODSON.

Witnesses:

J. E. HUTCHINSON, Jr.,
THOMAS HOWE.