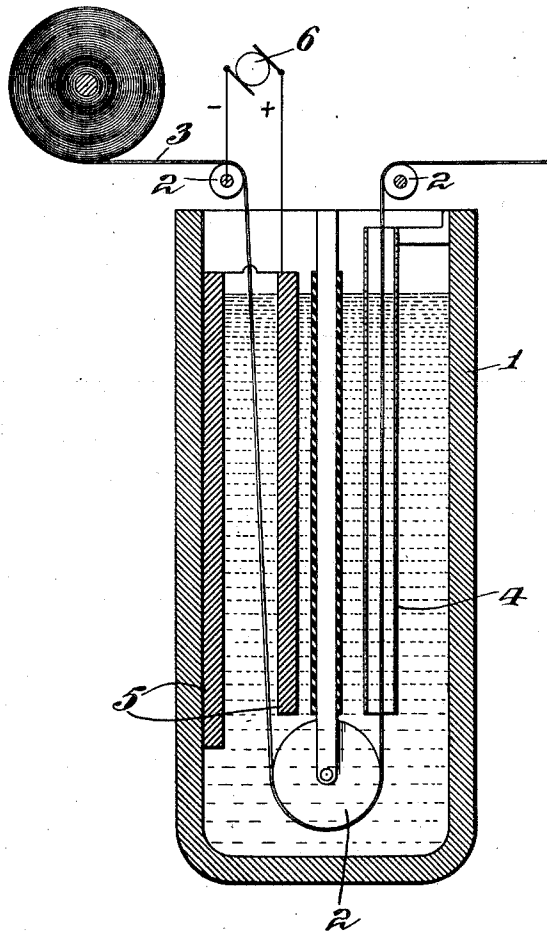


No. 821,622.

PATENTED MAY 29, 1906.

T. A. EDISON.  
PROCESS OF CLEANING METALLIC SURFACES.  
APPLICATION FILED JUNE 29, 1904.



Witnesses  
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# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

## PROCESS OF CLEANING METALLIC SURFACES.

No. 821,622.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed June 29, 1904. Serial No. 214,652.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, residing at Llewellyn Park, Orange, county of Essex, State of New Jersey, have invented a certain new and useful Process of Cleaning Metallic Surfaces, of which the following is a description.

My invention relates to an improved process of cleaning long continuous metallic surfaces or strips preliminary to subsequent treatment by which the surface is coated with another metal or material—as, for example, in processes of electroplating, amalgamating, tinning, galvanizing, enameling, &c. In treating such surfaces in a continuous manner it is desirable to pass the same continuously through a suitable bath, which may be either a solvent or electrolyte, by which the oil, grease, dirt, oxid, &c., will be removed from the surface of the material, so as to leave a clean surface for receiving the coating referred to, in order that the coating may be free from bare spots and adhere tenaciously. The impurities thus removed from the material, especially oil and grease, float upon the surface of the bath, so that the strip as it leaves the bath must ordinarily pass through such impurities, which will thereby contaminate the clean surface and necessitate a subsequent cleaning operation.

My invention has for its object the prevention of such contamination, the dispensing with a second or secondary cleaning operation, and the securing of a perfectly clean strip by passing the same through a single bath.

It may be employed in any continuous cleansing or pickling process, but is preferably applied to a process wherein the strip to be cleaned is employed as a cathode in an electrodeposition-bath and is opposed to an anode not attacked by the electrolyte and where there is no metal or substance in the solution which can be plated out, whereby the passage of a current of sufficient density results in the generation of large quantities of hydrogen gas on the surfaces to be cleaned, which gas in detaching itself from such surfaces mechanically strips off the foreign matter, so as to leave an absolutely clean surface. This result is largely facilitated by reason of the fact that the oil, grease, dirt, and other foreign material is more or less porous, so that the gas has an opportunity of forcibly detaching itself from the surface to carry the foreign material with it. This result is al-

most entirely mechanical, although there may be, of course, a slight reduction of any oxid present by potassium or hydrogen gas. I find, however, that if an iron object having a more or less rusty surface is subjected to this treatment the hydrogen gas mechanically separates the oxid, which floats off on the electrolyte without being reduced to any appreciable extent.

As I have already indicated, my improved process may be used in many arts and for the preliminary treatment of many different metals; but it has been designed particularly for use for cleaning long endless strips of thin sheet-iron which are to be subsequently nickel-plated for use in the make-up of my improved storage battery.

In the accompanying drawing I illustrate an apparatus suitable for carrying out my improved process. The drawing in question is a vertical sectional view.

In the drawing a suitable tank 1 is shown, formed of any desired material and provided with rollers 2 2, preferably insulated from the tank, and over which passes the endless strip 3, whose surfaces are to be cleaned. The support for the central roller, as shown, is preferably protected by an insulating-tube of soft rubber or other material not affected by the solution. The strip 3 leaves the solution through a tube 4, made preferably of glass or hard rubber, extending below the surface of the solution, so that any oil, grease, or dirt which may float on the surface will be kept free of the strip, as will be understood. I illustrate two anodes 5 5, which are composed of some material not attacked by electrolysis in the solution. The electrolyte used is preferably a ten-per-cent. solution of cyanid of potassium, and when such an electrolyte is used the anodes are formed, preferably, of pure carbon, such as graphite. Graphite I find is preferable over other forms of carbon, owing to its absolute insolubility in an alkaline solution when subjected to electrolysis. These anodes are arranged on opposite sides of a portion of the strip, so that the two faces thereof will be simultaneously cleaned. Current is furnished from a plating-dynamo or other source of supply 6, and the connections are such that the strip 3 or other article to be cleaned will act as the cathode. With such an apparatus the passage of the current between the anodes 5 and the strip-like cathode or other object to be cleaned results simply in the generation

of oxygen at the anodes, having no effect thereon, and of large quantities of hydrogen at the surface of the cathode, the current used being sufficient to generate hydrogen gas in large quantity. As explained, the hydrogen bubbles in being violently detached from the cathode-surfaces effect a very perfect cleaning by stripping off all foreign matter therefrom. I find in practice that the cleaning effect thus secured is of a very superior kind, so that when a subsequent coating, such as an electrical deposit of nickel, is applied to the strip such deposit will be effected with great uniformity and adhesion and at the same time is very homogeneous. Manifestly with an apparatus such as described as the strip 3 slowly progresses through the solution its surfaces will be successively or progressively cleaned, so that the apparatus becomes a continuous one. At the same time since the strip leaves the solution by passing through the tube 4 there is no danger of any of the foreign-matter which may float on the surface of the solution contaminating the cleaned surfaces.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. The process of cleaning continuous metallic strips which consists in passing the strip through a suitable cleansing-bath and in removing the strip from said bath through a conduit extending below the surface thereof, substantially as set forth.

2. The process of cleaning continuous metallic strips, which consists in passing the strip as a cathode through an electrolytic solution opposed to an anode not attacked by the solution and in removing the strip from the solution through a closed conduit, leading below the surface of the solution, substantially as set forth.

3. The process of cleaning continuous metallic strips, which consists in passing the strip as a cathode through an alkaline solution opposed to a carbon anode and in removing the strip from the solution through a closed conduit leading below the surface of the solution, substantially as set forth.

This specification signed and witnessed this 24th day of June, 1904.

THOS. A. EDISON.

Witnesses:

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