

# UNITED STATES PATENT OFFICE.

ROBERT MCKNIGHT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
MATTHEW J. GRIER, OF SAME PLACE.

ART OF COATING METALS WITH ALUMINIUM OR ALLOYS THEREOF.

SPECIFICATION forming part of Letters Patent No. 547,381, dated October 1, 1895.

Application filed September 9, 1893. Serial No. 485,141. (No specimens.)

*To all whom it may concern:*

Be it known that I, ROBERT MCKNIGHT, a citizen of the United States, and a resident of the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in the Art of Coating Metals with Aluminium or Alloys Thereof, of which the following is a clear and sufficient specification.

The principal portion of my invention consists in covering the metal to be coated with the aluminium with a coating of a metal, preferably alloying with the aluminium slightly, and so permitting a coating of the latter to adhere to the metal intended to be the foundation of the plated article, this metal forming the primary coating being a metal ordinarily fusible at a lower temperature than aluminium and also having an affinity for the metal to be coated, so as to bind the aluminium coating to the same.

In the practical carrying out of my invention I first coat the article, which may be of iron, brass, copper, or other metal, with a coat of tin or zinc, either as ordinarily done by dipping in the molten tin or zinc, or, when a very thin coating of zinc or copper or when the aluminium coating is to be very fine, the plating of the tin or zinc, or tin and zinc may most advantageously be done by electroplating to get a thin and very even coating of these metals. The article so coated with zinc or tin is then ordinarily cleansed with a dilute mixture of hydrofluoric and sulphuric acids and dipped into the molten aluminium or its alloy, which dipping can be done either after drying or while still wet from the cleansing.

I find that while with chemically-clean iron, copper, or brass the aluminium will only alloy and impregnate instead of coating with pure aluminium, owing to the fact that the article has to be immersed for sometimes as much as five minutes, yet if such chemically-clean brass, copper, iron, or other metal less fusible than aluminium be coated with either tin or zinc the time required for immersion is only a few seconds, and an aluminium coating with little if any alloying is the result. When the aluminium of the bath is not used pure, but

alloyed, a small quantity of any metal that alloys with aluminium, such as lead, may be introduced into the bath.

While I am aware that aluminium has been plated by the use of the salts of zinc or tin, yet such salts are not used by me, and I have found it practically impossible to plate aluminium upon cast-iron by that process, while if the cast-iron be first tinned or galvanized the coating was readily accomplished. I do not, however, consider that any process by which a salt of a metal, which metal is more fusible than aluminium, is reduced and a film of the metal base thereof deposited on the foundation metal before the introduction of the same into the aluminium-bath is outside of my invention.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The process of coating metals with aluminium which consists in coating the foundation metal with a film of a metal more fusible than aluminium, and then dipping the metal thus coated, in the presence of an acid capable of combining with the metallic film, into a bath of molten aluminium or alloy thereof substantially as described.

2. The art of coating metals less fusible than aluminium with aluminium, which consists in first covering the same with a coating of a metal fusible at a lower temperature than aluminium and having an affinity for the metal to be coated, then cleansing the coating in an acid bath and then dipping the article thus prepared in a bath of molten aluminium or alloy thereof substantially as described.

3. The art of coating metals with aluminium which consists in coating the foundation metal with a film of a metal more fusible than aluminium and having an affinity for the foundation metal and then treating it with an acid halogen compound, and dipping the foundation metal into a bath of molten aluminium or alloy thereof substantially as described.

ROBERT MCKNIGHT.

Witnesses:

M. W. COLLET,  
ARTHUR J. KERSHAW.