

UNITED STATES PATENT OFFICE.

MICHAEL EMME, OF ATLANTA, GEORGIA.

METHOD OF WELDING ALUMINIUM.

SPECIFICATION forming part of Letters Patent No. 428,834, dated May 27, 1890.

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To all whom it may concern:

Be it known that I, MICHAEL EMME, of Atlanta, Fulton county, Georgia, have invented a Method of Soldering, Joining, or Welding, or Uniting by a Metallic Cement Pieces of Aluminium, of which the following is a specification.

A solder for aluminium has long been sought for by chemists, metallurgists, and jewelers, but without success; and nice work in this metal where joints were necessary could only be accomplished by means of gold or silver rivets, or by the use of wire rivets made from aluminium. Electrical fusion of the metal has been employed; but its great cost and complexity place it beyond the use of ordinary artisans.

The following simple process for soldering or joining the metal (aluminium) can be used by any person who can use a mouth blow-pipe. On a smooth piece of wood charcoal or on any convenient or suitable holder or support lay a small quantity of common salt (chloride of sodium) moistened. On top of this bed of salt fix—for instance, on pins or by binding-wires—the pieces of aluminium to be joined or soldered in position, and project on the joint to be made a flame—that, for instance, of a blow-pipe—until the metal softens under the heat. With any sharp-pointed instrument penetrate the molten edges of the metal at the joint, thus facilitating the junction by removing the oxide and allowing the metal to flow from one side to the other of the joint. The chloride of sodium is volatilized, and under the heat of the flame the sodium engages the oxide of the film on the surface

of the aluminium, and the chloride of aluminium takes its place—*i. e.*, the place of the oxide. This chloride of aluminium, being volatile, is expelled from between the surfaces to be joined, leaving clean metallic surfaces to unite. The water formed by combustion and that adhering to the chloride of sodium is driven off and the excess of oxygen from the atmosphere continues to act upon the vaporized chloride of sodium. The chemical reaction is probably as follows: $6\text{NaCl} + \text{Al}_2\text{O}_3 + \text{H}_2\text{O} = \text{H}_2\text{O} + \text{Al}_2\text{Cl}_6 + 6\text{Na} + \text{O} + \text{O} + \text{O} + \text{Al}_2\text{O}_3$, &c.

The foregoing is a suitable formula for practicing my invention; but it may be varied somewhat without departing from the substance of my discovery.

I have stated above what I deem to be the rationale of my invention; but in this I may be in error.

What I claim to be new is—

The process herein described of uniting together pieces of aluminium, which consists in first removing the oxide from the contacting surfaces of the pieces by chemical action under heat, substantially as set forth, and at the same time softening the contacting parts by the heat, then mechanically puncturing and displacing the molten metal at the joint, so that it will flow from one side to the other and form a union.

In testimony of all which I have hereunto subscribed my name.

MICHAEL EMME.

Witnesses:

N. R. FOWLER,
J. A. VAN WINKLE.