

UNITED STATES PATENT OFFICE.

JAMES S. HOWARD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO FRANK G. BATES, OF SAME PLACE; SAID BATES ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO THOMAS CUNNINGHAM, LUCIAN BROWN, GEORGE BROWN, HORATIO B. LINCOLN, FRANK P. PENDLETON, AND HERMAN G. CUNNINGHAM, TRADING AS JAMES SMITH & CO., ALSO OF SAME PLACE—ONE-NINTH TO EACH.

IMPROVEMENT IN MANUFACTURE OF ALUMINIUM.

Specification forming part of Letters Patent No. **220,148**, dated September 30, 1879; application filed April 1, 1879.

To all whom it may concern:

Be it known that I, JAMES SPOONER HOWARD, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in the Production of Aluminium, of which the following is a specification.

My invention consists in economically manufacturing aluminium by subjecting a mixture of alum, carbonate of soda or equivalent alkali, charcoal or pulverized coal, and common salt to heat in a crucible or furnace, as described hereinafter.

In carrying out my invention, I dissolve alum in hot water and mix with the solution carbonate of soda. This mixture, after the water has been evaporated, constitutes the main ingredient in manufacturing aluminium. I mix the preparation of alum and soda with pulverized charcoal and common salt in proportions which may be varied to some extent. I may remark, however, that good results have been obtained by combining three ounces of salt and one of charcoal with every pound of the above preparation. I place this mixture in a crucible and the latter in a furnace, which should be maintained at about the temperature required to melt copper. Care should be taken to close the crucible with an appropriate cover, to prevent, as far as possible, the escape of the gases.

The time occupied in the production of the aluminium by this process varies considerably. Sometimes I have produced it after the crucible has been in the furnace for fifteen minutes. At other times it has required twenty-five minutes, and at others a much longer time.

In order to determine when the product has been completed, I slightly raise the cover of the crucible from time to time, and if I find that the gases evolved have a bluish tint the crucible may be removed from the furnace and the contents of the crucible poured out, among these contents being the aluminium.

Pulverized coal may be used in place of charcoal; but I have succeeded best with the latter.

I claim as my invention—

The mode described of manufacturing aluminium, the said mode consisting in subjecting a mixture of alum and carbonate of soda, or equivalent alkali, combined with charcoal and salt, to heat in a crucible or furnace, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES SPOONER HOWARD.

Witnesses:

HENRY HOWSON, Jr.,
HARRY SMITH.