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 ALLOYS OF ALUMINIUM.

Specification forming part of Letters Patent No. **220,149**, 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 Manufacture of Alloys of which aluminium forms a part, of which the following is a specification.

My invention consists of the economical mode described hereinafter of making alloys of which aluminium forms a part.

I first make a preparation consisting of alum and carbonate of soda by dissolving the former in hot water, then adding the soda, and finally permitting the water to evaporate.

If an aluminium bronze of which copper and zinc form parts has to be made, I melt the copper in an appropriate crucible, and while it is in a molten condition I add the above preparation and oxide of zinc, and mix them thoroughly with the molten copper, after which the crucible is closed and the application of heat continued.

This mixing of the contents of the crucible may be continued about half a minute, after which a cover should be placed on the crucible, or the contents of the crucible may be stirred through an opening in the cover, so as to prevent, as far as possible, the escape of gases and vapors.

The time taken to produce an alloy in a proper condition to be cast into ingots will vary from fifteen to twenty-five minutes, according to the proportions and character of the ingredients, the degree of heat employed, and other circumstances.

In order to determine when the alloy is in a proper condition, I raise the cover of the crucible from time to time, and if I find that the alloy is in a very fluid state the crucible may be removed from the furnace. If I find, however, that the mass is in a thick semi-fluid condition, it is an indication that it must be subjected to heat for some time longer.

The proportion of the ingredients used will vary in accordance with the desired character and color of the alloy.

For an alloy of deep gold color, for instance, I have used one pound of the above compound of alum and soda, six ounces of oxide of zinc, with two pounds of Lake Superior copper.

It is not necessary that the zinc which forms a part of this alloy should be introduced in the condition of an oxide. Metallic zinc in the desired proportion may, for instance, be introduced into the crucible containing the melted copper and the preparation of alum and soda.

An alloy of copper and aluminium may be made by simply mixing the said preparation with melted copper and subjecting the mixture to heat, as described above; but I have found in practice that the addition of zinc, either in the form of an oxide or metal, even if the proportion of zinc be very small, produces a more perfect alloy than when the zinc is omitted.

An alloy of copper, tin, and aluminium may be made by first fusing the copper and tin and then adding the preparation of alum and soda.

It will be understood that the proportion of metals alloyed with aluminium by my process may be varied as the desired product may suggest. Metals other than these referred to may be added to the copper, or nickel may be added to white alloys when a brilliant surface is desired.

I claim as my invention—

The mode described of producing aluminium alloys, the said mode consisting in introducing a preparation of alum and carbonate of soda or equivalent alkali into the molten metals, or metals with which the aluminium has to be alloyed, and subjecting the mixture to heat, all 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.