UNITED STATES PATENT OFFICE.

GRENVILLE MELLEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-HALF TO UNITED ALUMINUM INGOT COMPANY, A CORPORATION OF NEW YORK.

FLUX FOR PURIFYING ALUMINUM AND ITS ALLOYS.

1,092,935. Specification of Letters Patent. Patented Apr. 14, 1914.

No Drawing. Application filed June 26, 1912. Serial No. 706,041.

To all whom it may concern:

Be it known that I, GRENVILLE MELLEN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Fluxes for Purifying Aluminum and Its Alloys, of which the following is a specification.

This invention relates to means for purifying molten aluminum or its alloys from mechanically entrained impurities which result from frequent remelting of scrap metal, and from stirring the molten metal. The impurities are largely aluminum oxid, resulting from the superficial oxidation of the scrap; or from the oxidation of the metal when molten; said oxids being stirred in the mass of the metal and mechanically held therein, since oxid of aluminum has a higher specific gravity than the metal.

If a material which is non-oxidizing, and which boils at a temperature lower than the melting-point of aluminum, and of lower specific gravity than aluminum, be injected into the lower level of the molten metal, the vapors on arising through the metal will have the result of carrying the impurities to the surface where they may dissolve or combine with a flux on the surface; or if such impurities chemically or mechanically combine with the vaporizable material added, the resulting compound or mixture will rise to the surface, from which it may be removed in any suitable manner. I have found that the addition of sulfur to molten aluminum or its alloys has this property; and on injecting solid sulfur to the bottom of a container filled with the molten metal or alloy, the sulfur boils, and its vapors passing through the molten metal stir it vigorously, combining with the impurities either mechanically or chemically and carry them to the surface, from which they may be removed. It is advantageous to also add a fusible material having a low specific gravity which acts as a flux and serves to mechanically entrain or to chemically combine with the impurities, carrying them to the surface, from which they may be removed. I have further found that by adding sodium chlorid (salt) to molten sulfur, thoroughly stirring, and casting into rods, I obtain a material particularly adapted to remove the impurities above referred to. A rod of this material is plunged into the molten metal or alloy, and stirred, the salt melting and the sulfur boiling from the surface of the rod, the sulfur vapors bubbling through the molten metal, while the molten salt passes up more slowly. The combined action of the sulfur vapors and salt is to free the metal from its impurities by carrying them to the surface, where they form a flux or scoria with the salt, or with any other flux present, and from which they can readily be removed. The treatment of the molten metal or alloy is of greater or less duration depending upon the quantity of impurities present. The rod of salt and sulfur may contain from 30 to 70 per cent. of salt, an excess of salt or sulfur in the rod not materially affecting the results; an excess of salt, however, increases the life of the rod when immersed in the molten metal. When the rod of salt and sulfur is inserted, the sulfur gradually boils away, its vapors causing violent ebullition of the mass of metal, thoroughly agitating it, and carrying its impurities to the surface.

Instead of sodium chlorid, I may melt together sulfur and sodium sulfid.

To the surface of the molten metal may be added a flux such as sodium-meta-phosphate, or zinc chlorid, each of which fuses readily and combines with the salt and sulfur scoria or dross; it will further serve to effect a ready separation of the scoria from the molten metal.

I have found that aluminum scrap from different sources, such as scrap sheet, turnings, and castings that have been corroded by use and exposure to air and water, and which, if melted without any purifying agent, would produce a very impure metal, will, upon being treated with the purifying agency herein described, produce a metal equal in every way to new and hitherto unused metal.

I claim:

1. A flux for purifying aluminum and its alloys, comprising a plurality of fusible materials, solid at ordinary temperatures, one of which is volatile at the temperature of melted aluminum, and another fluid at the temperature at which aluminum is cast, and all of lower specific gravity than aluminum.

2. A flux for purifying aluminum and its alloys, comprising an integral mass solid at ordinary temperatures, containing a material volatile at the temperature of melted

aluminum, and another fluid at the temperature at which aluminum is cast, and all of a lower specific gravity than aluminum, said materials having the property of attracting the impurities ordinarily existing in remolten aluminum scrap.

3. A flux for purifying aluminum and its alloys, containing sulfur and a less fusible non-metallic carrier.

4. A flux for purifying aluminum and its alloys, comprising a rod or stirrer containing sulfur mixed with a fusible compound.

5. A flux for purifying aluminum and its alloys, containing sulfur and salt.

6. A flux for purifying aluminum and its alloys comprising sulfur in the proportion of 30 to 70 per cent., the remainder being a carrier less volatile than sulfur.

In testimony whereof I affix my signature in presence of two witnesses.

GRENVILLE MELLEN.

Witnesses:
ALBERT F. JAECKEL,
ETHEL BLACK.