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[54] **PROCESS FOR THE PRODUCTION OF A FLAKY POWDER OR BULKY FORM PARTICLES OF METALLIC ALUMINUM**

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[51] **Int. Cl.** **B02c 19/12**

[58] **Field of Search** ..... 241/4, 14, 23, 24, 29; 117/46 R, 46 CA; 209/11, 2, 3, 4

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[57] **ABSTRACT**

A process is provided for the production of aluminum particles or powders in bulk form which comprises the steps of crushing paper backed aluminum foil (i.e., aluminum foil laminated paper) heating (i.e., burning or baking) the crushed paper backed laminated aluminum foil so as to separate and remove substances other than aluminum therefrom, and grinding the remaining aluminum foil.

8 Claims, No Drawings

PROCESS FOR THE PRODUCTION OF A FLAKY POWDER OR BULKY FORM PARTICLES OF METALLIC ALUMINUM

This invention relates to a process for the production of a flaky aluminum powder or particles of metallic aluminum in bulk form from aluminum foil laminated papers (that is, paper backed aluminum foil).

Metallic aluminum powders are in great demand for use in paints, printing, foamed concrete, explosives and materials for exothermic hot tops which are used in the making of steel ingots, and so on. In addition, metallic aluminum foil in granulated form is used as a suitable material for exothermic hot tops because it is porous and is of low bulk specific gravity.

It is dangerous to process a metallic aluminum mass of foil into fine powder or a fine particle form since it ignites rather easily. In practice, present processes employed for accomplishing this require complicated equipment and a shielding atmosphere of inert gas. In addition, since the aluminum powder or particles oxidize easily, it is difficult to obtain a high yield of unoxidized aluminum powder or particles.

A process has now been found that eliminates the abovementioned conventional defects and safely and easily produces flaky aluminum powder or particles of the metallic aluminum in bulk form. Basically, this process utilizes aluminum foil laminated papers which are treated by means of the specific manufacturing steps described hereinafter in detail. It is noted that as used herein the term "bulk form" means an article in which small pieces of the metallic aluminum produced according to the instant invention have been aggregated together into a porous body which has no particular shape, the bulk specific gravity of which is relatively slow.

That is, the process for the production of flaky aluminum powder or particles of metallic aluminum in bulk form according to the present invention is characterized by comprising the steps of coarsely crushing a mass of aluminum foil laminated papers as described above, heating (burning or baking) the papers of said coarsely crushing pieces at a temperature between about **150°** and about **500°C** without oxidizing the aluminum foil of said pieces, separating said aluminum foil from the non-aluminum material present (that is, the baked product and the non-baked product), pulverizing the separated aluminum foil to prepare a flaky powder containing not less than **60%** by weight of metallic aluminum. If desired, said flaky aluminum powder is aggregated into small bodies or pieces to prepare aluminum particles in bulk form containing not less than **60%** by weight of metallic aluminum.

An example of the above described process according to the invention will now be described as follows:

EXAMPLE:

Aluminum foil laminated papers (i.e., paper backed aluminum foil) are formed into a pressed mass of a size suitable for crushing in a suitable crusher to produce a mass of coarsely crushed material. The resultant coarsely crushed pieces of material are heated (burned or baked) in a batch furnace or continuous furnace in non-oxidizing atmosphere at a temperature which will cause the paper to char but which will not cause the aluminum foil to fuse, that is, at a temperature in the

range from about **150°** to about **500°C**, and preferably from about **180°** to about **350°C**.

The coarsely crushed pieces are then taken out of the furnace after the papers are burned or baked (i.e., carbonized or charred). At this point the aluminum foil is almost completely separated therefrom.

Next, the resultant aluminum foil is ground with a hammer crusher or a stamp mill, and at the same time the small pieces of the aluminum foil may be further separated from any remaining charred paper or the non-baked product with an air separator or a cyclone.

It is possible to prepare small pieces of the aluminum foil which contain low amounts of carbonaceous substances by repeating the preceding steps according to need.

Sometimes carbonaceous substances are used in the material employed for exothermic hot tops utilized when making a steel ingot. Accordingly, if carbonaceous substances containing not less than **60%** by weight metallic aluminum can be tolerated in a given situation, the material of the invention can be employed as a hot topping agent.

The further separated and remaining small pieces of the aluminum foil can be further ground to prepare a flaky powder of said metallic aluminum.

On the other hand, the said further separated and remaining small pieces on the aluminum foil can be pulverized, for example, with a rotary pulverized equipped with a screen, and formed into aluminum particles in bulk form which are in the aggregated and crumpled ball state.

According to the process of the present invention, special machines are not required. Only the normal mechanical means employed in ordinary crushing treatments are used. With the present process it is possible to prepare a flaky aluminum powder or particles of aluminum in bulk form from the material of said aluminum foil laminated papers with easy, safety and economy.

The invention is also applicable to aluminum foil having an inorganic or resinous membrane layer instead of a layer of paper.

What I claim is:

1. A process for the production of aluminum powder in flake form comprising the steps of crushing aluminum foil laminated paper, heating said crushed aluminum foil laminated paper under substantially non-oxidizing conditions with respect to said aluminum foil to char the laminated paper, separating the charred paper from the aluminum foil, and grinding the resultant aluminum foil, whereby the desired aluminum particles are obtained.

2. The process of claim **1** wherein said heating results in the burning of said paper.

3. The process of claim **1** wherein said heating results in the baking of said paper.

4. The process of claim **1** wherein the heating is at a temperature in the range from **150°** to **500°C**.

5. The process of claim **1** wherein the resultant mass of aluminum particles is then further ground and any remaining charred paper is separated and removed from the mass.

6. The process of claim **1** wherein the resultant aluminum particles contains not less than **60%** by weight of metallic aluminum.

7. A process for the production of particles of aluminum in bulk form which comprises the steps of crushing

aluminum foil laminated papers, heating said crushed aluminum foil laminated paper under substantially non-oxidizing conditions with respect to said aluminum foil to char the laminated paper, separating the charred paper from the aluminum foil, grinding the resulting aluminum foil into small pieces, and aggregating said ground small pieces of the aluminum foil.

8. The process of claim 7 wherein the heating is at a temperature in the range from 150° to 500°C.

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