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METHOD FOR CLASSIFYING CERAMIC POWDER

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16. Abstract

Under the invented method, powder A of particles of less than 10μ, and carrier powder B, whose average particle diameter is more than five times that of powder A, are pre-mixed so that the powder is is less than 40 wt.% of the total mixture, before classifying.

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METHOD FOR CLASSIFYING CERAMIC POWDER

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Specifications /103*

1. Name of Inventiona

Method for classifying ceramic powder.

2. Requested Patent Coverage

Method for classifying ceramic powder under which powder A of particles of less than 10μ, and carrier powder B, whose average particle diameter is more than five times that of powder A, are pre-mixed so that the powder is is less than 40 wt.% of the total mixture, before classifying.

3. Explanation of Invention

Generally, there are two ways to classify ceramic powder by the particle diameter: wet method and dry method. With the wet method, while an appropriate choice of dispersion agent provides for a good particle dispersion, it requires somettreatment afterwards, such as drying. Also, if the material to be classified does not work with impurities, dispersion agent cannot be used. On the other hand, all dry methods - gravity, inertia force, centrifugal force, etc. - allow

*Numbers in the margin indicate pagination in the foreign text.

for immediate use of classified powder. However, it requires dispersing particles separately and evenly in the air, which is an extremely difficult task, as many raw powder materials for ceramic tend to cohere, resulting in cohered particles being classified as coarse particles. With groups of fine particles classified with coarse particles, an accurate classifying was impossible.

This invention offers a method of classifying highly cohesive fine powder with accuracy.

Fine ceramic powder is highly cohesive. The more coarse the particles, the less cohesive they are. Therefore, if fine powder is mixed well with more coarse powder, the fine powder adhere around coarse particles, and is less likely to cohere among themselves. This invention, in other words, uses coarse particles as carrier.

Together, when placed in a wind-powered classifier, they have much better dispersion ability than fine particles along, eliminating the chances of fine powder mixing in with coarse powder. Retrieved coarse powder contains coarse particles which were used as carriers. However, if the coarseness distribution is sufficiently larger than /104
the raw powder material, the retrieved powder can again be classified, this time by the intermediate particle diameter as a classifying point. This way, the coarse particles alone can be easily retrieved.

As an actual example, barium titaninate powder (average particle diameter - 2μ) and the same material, calcinated at a high temperature, as carrier (average particle diameter - 22μ), were mixed at the weight ratio of 20:80. After 30 minutes of mixing, the mixture was classified with 2 as a classifying point in a centrifugal wind-powered classifier. Figure 1 shows the particle size distribution curve: A is the size distribution of the fine powder and B is that of carrier powder. After classifying, the curves are as shown in Figure 3: E is the size distribution curve of classified fine powder and F, that of classified coarse powder. F contains B of Figure 1 (omitted in Figure 3), but this can easily be reclassified into F and B. Figure 2 shows the particle size distribution of the raw powder material A when it is classified alone: C is the size distribution of classified fine powder and D is that of classified coarse powder (as in Figure 3, size distribution of carrier powder B is omitted). Compared to F in Figure 3, distribution of D contains less fine powder, indicating higher classifying accuracy. Table below shows the yield and average particle diameter. Powder of distribution E has larger yield than that of distribution C. This is due to that cohered particles were contained as coarse particles in distribution D under the conventional method.

Yield and Average Particle Diameter of Each Powder

Curve	Yield(wt.%)	Av. Particle Dia. (μ)
A	-	2.0
B	-	2.3
C	31	1.4
D	69	2.5
E	47	1.3
F	53	2.9

This method is effective when the fine powder to be classified is less than 10μ, as they are highly cohesive. Requirements for carrier powder are that its average particle diameter is more than five times that of fine powder and that it is not very cohesive, which make it easy to separate coarse powder and coarse carrier powder in classifying. Anything can be used as carrier as long as these requirements are met. If mixing impurities is not desirable, the same material with sufficiently larger particle distribution is preferable - for example, in the case of ceramic powder, the powder having larger particle diameter by having been calcinated at higher temperature. Appropriate mixing ratio of carrier powder should be determined upon ratio of each particle diameter. If the carrier is less than 60 wt.% of the total, however, it does not achieve the purpose of lessening cohesion of the fine powder. Too much carrier also decreases the ability.

The invention is as described above, offering a simple method of accurately classifying highly cohesive fine powder.

Figure 1 shows particle size distribution curves of raw fine powder material and carrier powder before classifying; Figure 2, particle size distribution curves of fine powder contents and coarse powder contents, with carrier cearse carrier powder eliminated, after classifying, under the conventional method; and Figure 3, size distribution curves of fine powder contents and fine powder contents, with coarse carrier powder eliminated, after classifying, under the invented method. /10

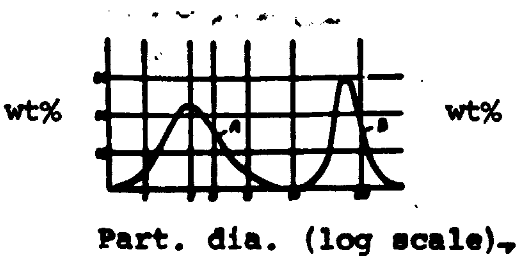


Figure 1

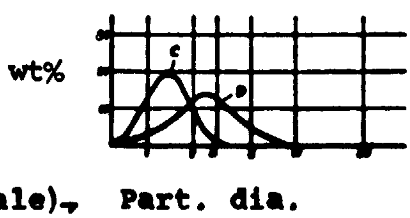
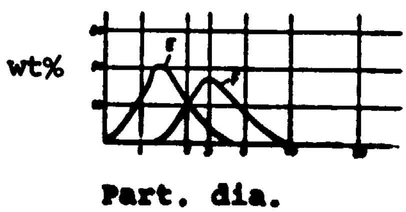


Figure 2



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