



United States Patent and Trademark Office

[Home](#) | [Site Index](#) | [Search](#) | [FAQ](#) | [Glossary](#) | [Guides](#) | [Contacts](#) | [eBusiness](#) | [eBiz alerts](#) | [News](#) | [Help](#)

Publication Number: 03899144

Section: Claims 4 of 4 pages

[Help](#)

▲ **Full Text**
? **Help**

Go to Page:

 

Sections:

- **Front Page**
- **Drawings**
- **Specifications**
- **Claims**

3,899,144

3

The Silanox treated titanium dioxide pigment is further protected from the deleterious effects of adsorbed moisture by incorporation of silica gel. The silica gel preferentially adsorbs water vapor that the powder may be exposed to after drying and before use. The silica gel used is a powder product, such as Syloid 65 from the W. R. Grace and Co., Davison Chemical Division, and has an average particle size about 4.5 μ and a large capacity for moisture at low humidities.

A typical powder composition used is shown in Table 1. This formulation was blended intimately with a Patterson-Kelley Co. twin shell dry LB-model LB-2161 with intensifier. Batches of 1500 g were blended for 15 min. each and packaged in 5-lb cans. The bulk density of the blended powder is 0.22 g/cc. Since deagglomeration is facilitated by having the powder bone dry, the powder should be predried before sealing the cans. In view of long periods (e.g., about 4 months) between powder preparation and use it is found preferable to spread the powder in a thin layer in an open container and place in a 400°F over two days before planned usage. The powder is removed and placed in the hopper about 2 hours before use.

Table 1

CONTRAIL POWDER FORMULATION	
Ingredient	% by Weight
TiO ₂ (e.g., DuPont R-931) median particle size 0.3 μ	85
Colloidal Silica (e.g., Cabot S-101 Silanox) primary particle size 0.007 μ	10
Silica gel (e.g., Syloid 65) average particle size 4.5 μ	5

Other type powder compositions can also be used with the apparatus described herein. For example, various powder particles which reflect electromagnetic radiation can be dispensed as a chaff or the like from the contrail generator.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claim is:

1. Contrail generation apparatus for producing a powder contrail having maximum radiation scattering ability for a given weight material, comprising:

- a. an aerodynamic housing;
- b. a jet tube means passing through said housing, said tube means having an inlet at a forward end of said housing and an exhaust at a rearward end thereof;
- c. a powder storage means in said housing;
- d. a deagglomeration means also in said housing;
- e. means connecting said powder storage means with said deagglomeration means for feeding radiation scattering powder from said powder storage means to said deagglomeration means;
- f. the output of said deagglomeration means dispensing directly into said jet tube means for exhausting deagglomerated powder particles into the atmo-

4

sphere to form a contrail; and
h. means for controlling the flow of said powder from said storage means to said deagglomeration means.

2. Apparatus as in claim 1 wherein said jet tube means is a ram air jet tube.

3. Apparatus as in claim 1 wherein an upstream deflector baffle is provided at the output of said deagglomeration means into said jet tube means to produce a venturi effect for minimizing back pressure on said powder feeding means.

4. Apparatus as in claim 1 wherein said deagglomerator means comprises:

- a. means for subjecting powder particles from said powder storage means to a hammering action to aerate and precondition the powder; and
- b. a jet mill means to further deagglomerate the powder into separate particles.

5. Apparatus as in claim 4 wherein pressurized gas means is provided for operating said deagglomeration means.

6. Apparatus as in claim 1 wherein said radiation scattering powder particles are titanium dioxide pigment having a median particle size of about 0.3 microns.

7. Apparatus as in claim 1 wherein said radiation scattering powder particles have a coating of extremely fine hydrophobic colloidal silica thereon to minimize interparticle cohesive forces.

8. Apparatus as in claim 1 wherein the formulation of said powder consists of 85% by weight of TiO₂ pigment of approximately 0.3 micron media particle size, 10% by weight of colloidal silica of 0.007 micron primary particle size, and 5% by weight of silica gel having an average particle size of 4.5 microns.

9. The method of producing a light radiation scattering contrail, comprising:

- a. surface treating light scattering powder particles to minimize interparticle cohesive forces;
- b. deagglomerating said powder particles in two stages prior to dispensing into a jet tube by subjecting said powder particles to a hammering action in the first stage to aerate and precondition the powder, and by passing said powder through a jet mill in the second stage to further deagglomerate the powder;
- c. dispensing the deagglomerated powder from the jet mill directly into a jet tube for exhausting said powder into the atmosphere, thus forming a contrail.

10. A method as in claim 9 wherein said light scattering powder particles is titanium dioxide pigment.

11. A method as in claim 9 wherein said powder particles are treated with a coating of extremely fine hydrophobic colloidal silica to minimize interparticle cohesive forces.

12. A method as in claim 11 wherein said treated powder particles are further protected with a silica gel powder.

* * * * *