

UNITED STATES PATENT OFFICE

2,316,358

FLASH POWDER AND METHOD OF PREPARATION

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No Drawing. Application August 2, 1940,
Serial No. 350,031

5 Claims. (Cl. 52—24)

My invention relates in general to flash powders such as are used for flashlight photography. More particularly, my invention relates to an improved composition and method of manufacture of such flash powders.

One object of my invention is to provide a flash powder having a much greater light output than that of flash powders heretofore in use.

Another object of my invention is to provide a flash powder which is considerably safer than the conventional flash powder in general use at present.

Still another object of my invention is to provide a method for manufacturing the improved flash powder.

Further objects and advantages of my invention will appear from the following description of a species thereof.

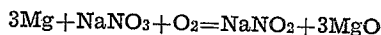
The flash powder according to the invention comprises essentially an admixture of approximately 100 parts by weight of sodium nitrate (NaNO_3) and between 150 and 450 parts, but preferably 300 parts by weight of powdered magnesium. This admixture is prepared in the following manner:

Approximately 100 parts by weight of sodium nitrate is first mixed with approximately 100 parts by weight, i. e., approximately one-third of the total magnesium content, of powdered magnesium which has been passed through a 100 mesh screen. This mixture is then thoroughly ball milled, after which it is intimately mixed with approximately 200 parts by weight, i. e., approximately two-thirds of the total magnesium content, of 100 mesh magnesium powder. In other words, the ball milled mixture is mixed with additional magnesium powder in an amount approximating twice that of the magnesium content of the ball milled mixture with which it is mixed, by shaking in a container. The resulting admixture constitutes the flash powder composition according to the invention.

The improved flash powder emits a flash of light which is from 10 to 40 times as bright as that emitted by a standard flash powder. One grain of the powder gives approximately the same illumination as two standard photoflash lamps of the type commercially known as No. 20. The gain in brilliancy is due largely to the method of preparation, i. e., the method of mixing the powders and the control of the grain size thereof. If all the mixture is ball milled, or if it is all prepared by shaking, then the light output of the resulting admixture is only about $\frac{1}{10}$ of the output of the flash powder prepared according

to the invention. The "all ball milled" product packs easily, seems moist to touch, and is lighter in color than the product of the invention. The latter flows easily as compared to the "all ball milled" product. The above-mentioned decrease in light output also occurs if finer or coarser magnesium powder is used instead of the particular grain sizes specified hereinabove. Thus, 50 mesh or 300 mesh magnesium powder gives very poor results. I have found that the fineness of the magnesium powder should be held rather close to 100 mesh.

The chemical reaction that takes place upon ignition of the improved flash powder, when exposed to the atmosphere, is probably given by the following equation:



which converts the nitrate into a nitrite and oxidizes the magnesium partly with the oxygen from the nitrate radical and partly with the oxygen from the air. The emission of light, however, is largely due to the sodium, since the light is brilliant yellow and is distributed to each side of the yellow sodium resonant line extending from 6600 Å. to 5000 Å. Such a light emission is very satisfactory for the exposure of photographic films and plates of the panchromatic type. That the sodium is the essential element in the production of the light is also indicated by the fact that no other nitrate gives the same color light or brilliancy.

The improved flash powder does not have a particularly fast ignition characteristic, the ignition time being of the order of $\frac{1}{10}$ of a second or thereabouts. The ignition may be conveniently effected with a red-hot or incandescent wire or filament, or by any other suitable means such as a spark coil or fuse wire.

An important feature of the flash powder according to the invention is its greater safety, it being considerably safer than the conventional flash powder. A percussion cap will not set the powder off.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A flash powder comprising a thoroughly ball milled mixture of sodium nitrate and magnesium powder having a fineness of the order of 100 mesh in the proportions of approximately 1 part by weight of sodium nitrate to between $\frac{1}{2}$ to $1\frac{1}{2}$ parts by weight of magnesium, said mixture being intimately admixed, by shaking, with additional magnesium powder having a fineness of the order of 100 mesh in an amount approximating

twice that of the magnesium content of said ball milled mixture.

2. A flash powder comprising a thoroughly ball milled mixture of sodium nitrate and magnesium powder having a fineness of the order of 100 mesh in the proportions of approximately 1 part by weight of sodium nitrate to approximately 1 part by weight of magnesium, said mixture being intimately admixed, by shaking, with additional magnesium powder having a fineness of the order of 100 mesh in an amount approximating twice that of the magnesium content of said ball milled mixture.

3. A flash powder comprising a thoroughly ball milled mixture of sodium nitrate and approximately 100 mesh magnesium powder in the proportions of approximately 1 part of sodium nitrate to approximately 1 part of magnesium powder, said mixture being intimately admixed, by shaking, with approximately 100 mesh magnesium powder in the proportions of approximately 1 part of said ball milled mixture to 1 part of said magnesium powder.

4. A method of preparing flash powder which comprises mixing sodium nitrate with approxi-

mately 100 mesh magnesium powder in the proportions of approximately 1 part of sodium nitrate to 1 part of magnesium powder, thoroughly ball milling said mixture, adding to said mixture an addition of approximately 100 mesh magnesium powder in the proportions of approximately one part of said ball milled mixture to 1 part of said additional magnesium powder, and shaking said powders into intimate admixture.

5. A method of preparing flash powder which comprises mixing sodium nitrate with magnesium powder having a fineness of the order of 100 mesh in the proportions of approximately 1 part by weight of sodium nitrate to between $\frac{1}{2}$ to $1\frac{1}{2}$ parts by weight of magnesium, thoroughly ball-milling said mixture, adding to said ball-milled mixture a further substantial quantity of the said magnesium powder in an amount sufficient to produce in the final product a total content of up to $4\frac{1}{2}$ parts by weight of magnesium to the said one part by weight of sodium nitrate, and then shaking said ball-milled mixture and the said additional magnesium powder into intimate admixture.

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