UNITED STATES PATENT OFFICE.

GOTTLIEB KREBS, OF OFFENBACH-ON-MAIN, GERMANY.

FLASH-LIGHT POWDER.

No. 918,558. Specification of Letters Patent. Patented April 20, 1909.

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To all whom it may concern:

Be it known that I, GOTTLIEB KREBS, subject of the Emperor of Germany, residing in Offenbach-on-Main, in the Empire of Germany, manufacturer, have invented certain new and useful Improvements in Flash-Light Powders.

This invention relates to the manufacture of light producing compounds of the most varied periods of combustion and having very especial photochemical properties.

The improved light producing compounds are made in such a way that they not only are of unlimited permanency, but also give off but very little smokeless and entirely non-poisonous gases.

The important feature in this invention consists in enabling colored exposures to be made with these improved composite powders, so that any suitable color may be reproduced in its correct color value without necessitating the use of the light filters which were hitherto necessary.

In these improved light producing compounds, such substances are employed which have been found to be absolutely permanent when mixed with others, namely powdered and dehydrated chrome alum, also dehydrated sulfates of copper, and finally the sulfates of the rare earths and metallic sulfates. These substances, in order to be able to exactly regulate their period of combustion, are mixed with suitable quantities of oxids, protoxids, or carbonates of the rare or alkaline earths and metals, also with silicates, such for instance as glass powder, or sugar, flour, dextrin and like substances, in such a way that by means of these additions combustion is retarded as much as is necessary for a flame coloring action of the respective color. These mixtures may be burned either in the form of powder loosely scattered about, or in the form of cartridges or tablets or pressed into strings. In selecting the flame coloring substances, care must be taken that they do not chemically decompose when brought into contact with the constituents of the respective powder mixture, as such mixture would cease to flame after a short time. Such additions must also contain no poisonous gases or produce much smoke, and must not be explosive, as otherwise the technical advantages are illusory. After many experiments, it has been found that the fluorids are suitable as flame coloring substances if they fulfil all the conditions hereinbefore set forth. Thus for instance for yellow and orange light filters fluorid of sodium and fluorid of calcium are employed. For blue filters, fluorid of copper, for green filters fluorid of barium and for red filters fluorid of lithium. Other flame coloring substances may however be employed, such for instance as zinc dust, copper bronze, cæsium, rubidum, thallium, indium and like salts, more particularly also the organic compounds of all these flame coloring substances.

Examples: For making colored time-light cartridges, which serve both as artificial source of light and as a substitute for a color filter in photography with sensitive plates, filaments or papers in the three color photography, there is taken:

A. As a substitute for yellow or orange filters; 2 grains of aluminum powder, 2 grains of magnesium powder, 2 grains of sugar, 0.4 grain of fluorid of sodium.

B. As a substitute for blue light filters; 2 grains of magnesium powder, 2 grains of aluminum powder, 2 grains of sugar, 0.3 grain of zinc dust.

C. As a substitute for green light filters;—2 grains of aluminum powder, 2 grains magnesium powder, 2 grains cerium carbonate, 0.4 grain fluorid of barium.

D. As a substitute for red light filters;—2 grains of aluminum powder, 2 grains of magnesium powder, 1 grain thorium sulfate, 1 grain of oxid of cerium, 0.3 grain of fluorid of lihtium, 0.3 grain of oxid of lithium.

In all these examples the mixtures of the powders may be mutually exchanged or replaced by similar mixtures. All the powders may finally be mixed with one another and burned.

I claim as my invention:

A composition for producing colored light, consisting of two parts of aluminum powder, two parts of magnesium powder, two parts of sugar, and four tenths part of fluorid of sodium.

In witness whereof, I have hereunto signed my name this 27th day of September 1905, in the presence of two subscribing witnesses.

GOTTLIEB KREBS.

Witnesses:
JEAN GRUND,
CARL GRUND.