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SMOKE-PRODUCING COMPOSITION

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7 Claims. (Cl. 252—305)

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The present invention relates to a composition for use in distress signals and other devices which may be caused to emit a stream of smoke.

Distress signals capable of emitting a stream of smoke which will rise into the sky for substantial heights, may be used by those at sea, in deserts, forests, etc., so that searching parties may locate them. They are particularly useful in indicating the position of persons lost at sea, as a rising column of smoke, if of the proper color, may be seen for great distances by searching ships or aircraft.

A smoke for signal purposes should be of such a color as to be visible against the surrounding background for the greatest distance. Also, it should be of such a nature that it will tend to cling together in the form of a dense cloud, as the distance at which such smoke is visible decreases as the smoke disperses and loses its density.

It has been determined that a dark orange-colored smoke is visible for substantially greater distances at sea than smoke of other colors. Hence, as one of the main uses for distress signals is to indicate the position of persons lost at sea, the object of the present invention is to provide a composition which, on burning, will produce a smoke of dark orange color and of such a nature that it tends to cling together in the form of a dense cloud.

The composition which I have found to be most satisfactory in producing a smoke of the desired color and density, comprises oil-orange color, potassium chlorate or potassium perchlorate, a substance such as sugar, which is the source of carbon and heat, and relatively small amounts of silica-gel and ammonium sulfate, which will further increase the density of the smoke.

The term "oil-orange color" is used herein to designate an orange color of an oily nature. When the other constituents of the smoke-producing composition are burned, the oil-orange color will be vaporized or volatilized and impart an orange color to the smoke, and the oily particles which subsequently condense in the rising column of smoke are carried along with it and form nuclei to which particles of the smoke cling, thereby causing the smoke to be maintained in the form of a dense column or cloud. The oil-orange color may be "Sudan I Oil Orange, Schultz No. 36," which is made from aniline and beta naphthol, or any other compound or composition which on vaporization or volatilization will have the property of imparting an orange color to the smoke, and which on subsequent condensation of

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portions thereof in the rising smoke will form particles to act as nuclei to which the particles of smoke cling. The oil-orange color should be present in the composition in an amount from about 50% to 70%.

The sugar is added to the composition to the extent of about 14% to 24%. The sugar is the source of carbon and heat which enables the composition to burn and give a uniform heat to vaporize the oil-orange color. The sugar may be dextrose, glucose, sucrose, fructose, lactose, or mixtures thereof. Commercial corn sugar consisting of a mixture of dextrose and glucose has been found particularly satisfactory. In some instances, the sugar may be replaced by other materials such as starch, dextrin, charcoal, lampblack, sawdust, etc., all of which are sources of carbon and heat and will enable the composition to burn and produce a uniform heat.

The potassium chlorate, or the potassium perchlorate, being a strong oxidizing agent, renders the composition readily ignitable. The amount thereof added to the composition should be maintained within rather narrow limits. If too little is added, the composition is not sufficiently inflammable; if too much is added, the composition will burn with such vigor that the oil-orange color will be destroyed, with the oil thereof being carbonized and imparting a black color to the resulting smoke. In order that the composition may be readily ignited and may burn with the desired rapidity, the amount of potassium chlorate should be maintained between about 14% and 24%.

As the composition ordinarily will be ignited and burned in a container which is closed, except for a small emission opening, as disclosed in my application Serial No. 513,798, filed December 10, 1943, the use of sugar in combination with potassium chlorate or potassium perchlorate is particularly desirable, as the two, on burning, form a gas which creates the necessary pressure to expel the smoke through the smoke-emission opening and causes it to leave the container in the form of a dense stream of relatively small cross-sectional dimensions. Such a stream will rise to great heights without becoming dispersed to an extent which will prevent it from being visible for miles.

The ammonium sulfate is added to the composition as it further increases the density of the smoke and causes it to cling together. Relatively small amounts are sufficient. As little as .5% or 1% of ammonium sulfate will materially increase the density of the smoke. However, in

some cases, amounts up to 5% may be found desirable.

The inclusion of silica-gel in the composition maintains it in a dry condition so that ignition thereof readily wll take place, as it selectively will absorb any moisture present in the atmosphere to which the composition is exposed. The amount of silica-gel present may be as little as 1% on a dry basis, although in some cases as much as 5% may be found desirable.

All of the above amounts are by weight.

A composition which I have found to be particularly desirable in producing a dark orange-colored dense smoke consists of

	Per cent
Oil-orange color	59
Potassium chlorate	19
Sugar (commercial corn sugar)	19
Silica-gel	2
Ammonium sulfate	1

A composition comprising oil-orange color, potassium chlorate, sugar, silica-gel and ammonium sulfate in the amounts herein set forth, on burning, will yield large amounts of smoke which first is of yellow-green color, but which gradually turns to a dark orange color. The smoke is quite dense and will rise to a great height while still clinging together in the form of a dense column or cloud, visible for many miles.

From the foregoing it will be understood that the present invention provides a composition which is readily ignited, will burn uniformly at the desired rate, with the liberation of the proper amount of heat to vaporize the oil-orange color without destroying it, and which will produce large volumes of dense smoke of dark orange color visible at sea for many miles.

What I claim is:

1. A smoke producing composition comprising from about 50% to about 70% of oil-orange color, from about 14% to about 24% of an inorganic salt which liberates oxygen on heating, from about 14% to about 24% of a carbon-containing combustible material, and from about 0.5% to about 5% ammonium sulfate, said amounts being by weight.

2. A smoke producing composition comprising from about 50% to about 70% of oil-orange color, from about 14% to about 24% of potassium chlorate, from about 14% to about 24% of a carbon-containing combustible material, and from about 0.5% to about 5% of ammonium sulfate, said amounts being by weight.

3. A smoke producing composition comprising from about 50% to about 70% of oil-orange color, from about 14% to about 24% of potassium perchlorate, from about 14% to about 24% of a carbon-containing combustible material, and from about 0.5% to about 5% of ammonium sulfate, said amounts being by weight.

4. A smoke producing composition comprising from about 50% to about 70% of oil-orange color, from about 14% to about 24% of a carbon-containing combustible material, from about 14% to about 24% of at least one sugar, and from about 0.5% to about 5% of ammonium sulfate, said amounts being by weight.

5. A smoke producing composition comprising about 59% of oil-orange color, about 19% of an inorganic salt which liberates oxygen on heating, about 19% of a carbon-containing combustible material, about 2% of silica-gel, on a dry basis, and about 1% of ammonium sulfate, said amounts being by weight.

6. A smoke producing composition comprising from about 50% to about 70% of oil-orange color, about 19% of an inorganic salt which liberates oxygen on heating, about 19% of a carbon-containing combustible material, about 2% of silica-gel, on a dry basis, and about 1% of ammonium sulfate, said amounts being by weight.

7. A smoke producing composition comprising about 59% of oil-orange color, about 19% of potassium chlorate, about 19% of at least one sugar, about 2% of silica-gel, on a dry basis, and about 1% ammonium sulfate.

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