

UNITED STATES PATENT OFFICE.

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COMPOUND FOR RAILWAY-SIGNAL FUSEES.

954,330.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, ISADORE NIDITCH, a citizen of the United States, residing at Dorchester, in the county of Suffolk and State of Massachusetts; have invented certain new and useful Improvements in Compounds for Railway-Signal Fusees, of which the following is a specification.

This invention relates to improvements in a compound for railway signal fusees, the primary object of which is to produce a compound which will not spontaneously ignite under the conditions to which fusees are subjected.

In all of the compositions for railway signal fusees known to me, there are certain characteristics of the chemicals of which they are composed that are found to produce spontaneous ignition.

As is well understood by those skilled in this art a railway signal fusee comprises a paper tube in which the composition is packed, carrying at one end a spike adapted to be driven or projected into the railroad bed or tie, and at its opposite end means for ignition. Railway signal fusees are usually thrown from the rear of a moving train and are, therefore, subjected to rough usage, and by reason of which it is necessary to have the paper tube of sufficient strength to withstand this usage without breakage.

In order to produce a signal fusee which is effective, it is necessary that the composition be of such a character that the wall of the paper tube be consumed uniformly with the combustion of the composition, to prevent the forming of what is known in the trade as a "chimney," which will so inclose and obstruct the light produced by the composition that it cannot be seen from such a distance as to make an effective signal. Furthermore, it is essential that the burning be of sufficient "force" to have the effective requirements of a proper signal; in that it must be visible a sufficient distance; must burn in all kinds of weather and under all adverse circumstances, such as strong winds, rain, sleet, snow, etc.

By reason of the necessity of burning the tube in uniformity with the burning of the composition and with the required "force," all successful compositions of signal fusees known to me contain sulfur and potassium chlorate, which are the fundamental ingredients to produce the above results.

It has been well known to those skilled in this art that sulfur in the presence of heat and moisture produces sulfurous and sulfuric acids, which in the presence of potassium chlorate decompose the latter and generate a gas known as chlorine peroxid which ignites spontaneously. The formation of sulfuric acid from sulfur requires the presence of oxygen which is readily obtained from the ease with which the potassium chlorate breaks up, and in breaking up and liberating the oxygen a certain quantity of heat is generated which accelerates and helps to continue the reaction, and thus tends to a condition that induces spontaneous ignition. It is also well known to manufacturers and users of fusees that frequently fires occur by reason of spontaneous ignition of railway signal fusees, which in their use are of necessity subjected to both heat and moisture; that these fires have been known to occur in the storehouses of railway companies; in the cabooses carrying these signals and, in some instances, this spontaneous ignition has occurred with the fusees carried in railway cars. This fact of spontaneous ignition of fusees has been a source of continual objection on the part of the railroad companies using them, and efforts have been made for years by manufacturers to produce a signal which will not be liable to spontaneous ignition, but so far as I am aware, this has not been heretofore accomplished.

In all practical signal fusee compositions known to me, the largest proportion thereof consists of the coloring ingredients which, for convenience, I will term the base, and this usually is a nitrate with strontium, barium or calcium as the metal, and also a carbohydrate either in the form of sawdust, starch or flour, and usually when sawdust is used it is combined with grease or paraffin, together with charcoal to regulate the burning, and antimony which slightly intensifies the color, in addition to the sulfur used as a combustible material, and potassium chlorate as the oxidizing agent.

My new fusee composition which removes all danger of spontaneous ignition, consists essentially of a coloring ingredient, a metallic nitrate, combined with sulfur, a carbohydrate and potassium perchlorate. These essential ingredients are preferably combined in about the following proportions: nitrate 85 per cent.; sulfur 13 per cent.;

carbohydrate, preferably greased sawdust 6 per cent., potassium perchlorate 14 per cent., charcoal 1 per cent. and antimony 1 per cent. However the charcoal and antimony may be omitted as they are not essential to my present invention. Tests of this new composition show that fairly good results may be obtained as to proportions of the whole mixture within the following limits; nitrate may be varied by increasing about 10 per cent. or decreasing about 35 per cent.; sulfur about 10 per cent. either way; carbohydrate about 5 per cent. either way; potassium perchlorate about 8 per cent. either way. A signal fusee composition comprising these essentials has been found to stand tests of moisture and heat far more severe than occurs in its use, it having withstood a temperature of 320° F. for one week without resultant charring of the paper tube and without spontaneous ignition, whereas the fusees hitherto used spontaneously ignite in practice at ordinary climatic temperatures as previously explained. It is also well-known that potassium chlorate and sulfur are readily exploded by friction, and signal fusee composition mixtures heretofore used, by reason of the presence of these ingredients, are liable to be ignited by friction and this necessitates extreme carefulness in handling them in the process of manufac-

ture. My new composition is not nearly so liable to ignition by friction or percussion, and therefore does not require anywhere near the same care in handling it, which makes it much safer in the process of manufacture.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A time burning signal fusee, comprising a metallic nitrate, sulfur, a carbohydrate, and a perchlorate all combined in about the proportions herein specified, producing a time burning signal fusee compound burning with brilliancy and force of flame for the purpose described, and which is not subject to spontaneous combustion.

2. A time burning signal fusee, comprising a metallic nitrate, sulfur, a carbohydrate and potassium perchlorate all combined in about the proportions herein specified, producing a time burning fusee compound with brilliancy and force of flame for the purpose described, and which is not subject to spontaneous combustion.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ISADORE NIDITCH.

Witnesses:

JOHN L. FLETCHER,
C. R. WRIGHT, Jr.