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SIGNAL TORCH

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6 Claims. (Cl. 52—23)

This invention pertains to signal torches such, for instance, as are used in railroad signaling to warn a train of the presence of an obstruction or other abnormal conditions ahead.

These torches sometimes called "fuses", are regularly constructed as a paper tube filled with a burnable material such as powder, the mixture containing a suitable ingredient to impart a particular color to the light given off by the flame. The tube is ordinarily closed at the bottom by a wooden plug secured thereto and armed with a spike adapted to be driven into a railroad tie or other means for holding the torch in upright position as it burns.

Such torches are required by the laws governing railroad and road traffic to meet certain conditions, particularly as to the time of burning. A certain type of torch, applicable more particularly to truck traffic is required to burn substantially thirty minutes. Difficulty has been encountered in constructing a torch capable of burning for thirty minutes and which may yet be limited to a practical length of tubing. The torches generally supplied heretofore have a length of approximately thirty inches which makes them unwieldy to handle and as they must be carried about for some time before use, renders them liable to injury.

One of the objects of this invention, therefore, is to provide a torch of this type in which the length of tube may be substantially reduced.

Another object is to provide a burning mixture for loading such a torch which has a rate of burning such that a torch having a length of approximately twenty inches may be made to burn for thirty minutes.

Another object is to provide a simple and reliable method for preparing such a burning mixture.

Further objects will appear from the following description in which the composition of such a burning mixture and a method for preparing the same are outlined:

It has been found that in preparing burning mixtures of the type here involved which contain one or more oxidizing ingredients, a retarding effect may be obtained by treating one or more of such ingredients with a nitrocellulose lacquer. While nitrocellulose is inflammable and, under some circumstances, explosive, yet it has been found that when it is mixed with a granular oxidizing compound such, for instance, as strontium nitrate in such a manner as to coat the grains of such compound, the lacquer acts as a deterrent so as to slow up the rate of burning of the mixture including the strontium nitrate. While in the present method it is preferred to apply this treatment to the strontium nitrate ingredient, a deterrent effect may be obtained by applying the treatment to other ingredients, such, for instance, as potassium nitrate or potassium perchlorate. The embodiment of the invention to which the following description is applied contemplates a torch adapted to emit a red signal light. Strontium salts are ordinarily used in such colored fire compounds to impart a red color. When the invention is applied to signals of other colors, the treatment may, of course, be applied to the coloring ingredient as described in the following. As is well known, other compounds are used for producing other colors. While strontium compounds produce red, copper compounds may be used for blue lights, sodium compounds for yellow lights and barium compounds for green lights.

In accordance with the present invention, an oxidizing ingredient, namely, the strontium nitrate is treated with the nitrocellulose lacquer and thereafter is mixed with additional ingredients, including additional quantities of strontium nitrate in order to make up the complete burning mixture. The time of burning may then be adjusted by suitably varying the proportions of treated and untreated ingredients.

One of the conditions required to be met by a torch of this type is that it shall burn without producing a so-called chimney. A chimney is formed by the charred residue of the tube which is incompletely burned and remains standing so as to mask a portion of the light produced. In order to accomplish complete combustion so as to burn the tube to light ash which will be blown away by the flame, the type of flame and its stability should be controlled. It has been found that treatment of the burning mixture with a wax such, for instance, as paraffine assists in stabilizing the flame and in producing such a temperature therein as to burn off the tube completely without leaving any chimney. It is desirable for this purpose to maintain a flame which has sufficient energy or spread to actually expel or blow away the ash formed by the burning tube. The action is further facilitated by maintaining a sufficient temperature of the flame so that the material is completely burned to ash and no charcoal remains. The wax used as an ingredient is effective in maintaining a stable flame under these conditions. Accordingly, this invention contemplates the treatment of the

mixture with a sufficient proportion of wax to produce this desirable effect.

The "fusee" composition which has been found most satisfactory for the purpose of this invention has the following composition in which percentages by weight are given. These percentages are more or less approximate and some variation from the given values is permissible:

	Per cent
Strontium nitrate	45
Nitrocellulose lacquer	4
About 34% of strontium nitrate treated with above amount of lacquer.	
Potassium perchlorate	7
Sulphur	6
Potassium nitrate	2
Sawdust	2
Petrolatum	2
Strontium carbonate	2
Paraffin	7

In the above composition about one-third (⅓) of the strontium nitrate is treated with the nitrocellulose lacquer. It has been found that by treating this proportion the retarding effect of the lacquer is sufficient to slow down the burning to the desired point. The method of treatment will be more fully described hereinafter.

In preparing the above composition it has been found desirable to make allowance for certain variations due to ageing and the like which affect the rate of burning. Accordingly, a method has been devised for making up a stock of fusee mixture in such a manner that a fairly accurate timing for the finished fusee can be accomplished.

In carrying out the method of this invention, a preliminary mixture is prepared which, for convenience, will be designated Mixture A. Mixture A is prepared as follows:

Mixture A

	Pounds
Strontium nitrate	390
Potassium perchlorate	62
Sulphur	56
Potassium nitrate	20
Sawdust	18
Petrolatum	15

Mixture A may be considered a standard red fire mixture. A second mixture is then prepared by taking the strontium nitrate and nitrocellulose lacquer in the proportions of 61 pounds of the nitrate to two gallons of the lacquer. These are mixed and well stirred together so that the grains of the strontium nitrate are completely coated with the lacquer. There is then added to this mixture, and this may be done before it is completely dry, 61 pounds of Mixture A (dry). These are again well stirred together and when this mixing is complete, the resulting powder is ordinarily substantially dry. When completely dry there is added more of Mixture A to the amount of 120 pounds. When this has been completely stirred in, Mixture B is complete. This mixture may be shown in tabular form as follows:

Mixture B

	Pounds
Strontium nitrate	61
Nitrocellulose lacquer	2
Mix and stir well	
Before completely dry add	
Mixture A (dry)	61
When completely mixed and dry add	
Mixture A	120

The lacquer may be prepared by dissolving nitrocellulose in ethyl or butyl acetate. These solvents have been found to work satisfactory, although other solvents may be employed to make the lacquer. Any suitable source of nitrocellulose may be used. Good results have been obtained by using up old smokeless powder salvaged from old cartridges, this being dissolved in ethyl or butyl acetate as stated above.

Mixture B may be prepared in any quantity and it is convenient to prepare it in sufficiently large quantities that it may be stored to be drawn upon for the preparation of the final mixture as needed. In preparing the final mixture which will be designated "Mixture C", there is added to an amount of Mixture B of 250 pounds a quantity of strontium carbonate in an amount of four pounds. The latter ingredient has an additional slowing-up effect on the rate of burning and is added to the mix to assist in adjusting the timing thereof. To this combination of Mixture B and strontium carbonate there is now added twenty pounds of paraffine. The paraffine is melted and the other ingredients stirred therewith at a temperature sufficiently high to keep the paraffine in molten condition. This is mixed until the paraffine is uniformly distributed throughout the mass. The final mixture is now prepared from this mass by simply adding a sufficient quantity of Mixture B to adjust the time of burning to the proper rate. The time may be tested by making up actual test samples as the preparation of Mixture C proceeds so as to test the timing. When the proper timing is obtained, the mixture is complete. The amount of Mixture B added for the adjustment of timing is ordinarily not over fifteen pounds. This gives the final mixture as follows:

Mixture C

	Pounds
Mixture B	250
Strontium carbonate	4
Paraffine	20

Paraffine is melted and the whole well stirred together.

Timing is adjusted by adding Mixture B (up to 15 lbs.) and testing until proper timing is obtained.

It has been found that a burning mixture prepared as described for Mixture C above when loaded into a standard torch tube of thirteen to fifteen inches in length will burn for substantially thirty minutes. Once the final mixture has been prepared and the timing adjusted, the required number of torches may be made up and will be found to burn at the required rate.

It is preferable to store the compound in the form of Mixture B rather than that of Mixture C for the reason that slight changes due to aging, temperature or the like take place in the mixture from time to time and that more accurate timing may be obtained by a final adjustment thereof in accordance with Mixture C.

It will be seen that this invention accomplishes its objects in providing a torch adapted to meet the railroad specifications as to time of burning, while at the same time its length is reduced to such an extent that the finished torch is not unwieldy and may be handled and carried about without inconvenience and with greatly reduced liability to damage. It is understood, of course, that torches of different color may be produced in accordance with this invention by simply substituting the proper compound for the strontium compound in the mixtures described.

It will be noted that the proportion of the fast-burning ingredient, strontium nitrate, which has been treated with the deterrent is substantially one-third of the total amount of said ingredient.

It is obvious that various changes may be made, within the scope of the appended claims, in the details of composition or procedure without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. A fuzee mixture containing an oxidizing ingredient treated with nitro-cellulose lacquer.

2. A fuzee mixture containing an oxidizing ingredient substantially one-third of which is treated with nitro-cellulose.

3. In the art of making timed burning mixtures for signal torches, the process comprising, preparing a colored-fire mixture containing an oxidizing ingredient, treating an additional quantity of such oxidizing ingredient with nitro-cellulose lacquer, and mixing the treated ingredient with said mixture.

4. In the art of making timed burning mixtures for signal torches, the process comprising, preparing a colored-fire mixture containing an oxidizing ingredient, treating an additional quantity of such oxidizing ingredient of substantially one third of the amount thereof in said mixture with nitro-cellulose lacquer, and mixing the treated ingredient with said mixture.

5. A fuzee comprising a colored-flame-producing component surface treated with nitrocellulose lacquer.

6. In the art of making fuzee mixtures, the process comprising, preparing a colored-fire-mixture, incorporating the prepared mixture with nitrocellulose lacquer, and after the solvent has evaporated from the lacquer adding additional colored-fire-mixture.

HARRY E. SHERMAN.

CERTIFICATE OF CORRECTION.

Patent No. 2,073,530. March 9, 1937.

HARRY E. SHERMAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 5, for ""fuses"" read "fusees"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of April, A. D. 1937.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.