Dec. 3, 1946. J. VINTON ET AL 2,412,018

RAILROAD FUSEE

Filed Sept. 20, 1943

Fig. 1

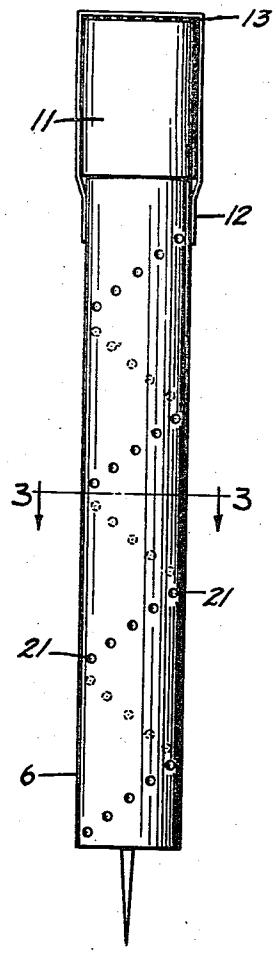


Fig. 2

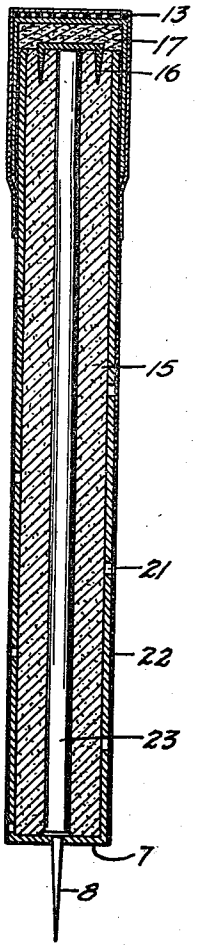
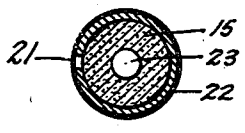


Fig. 3



INVENTOR.
Douglas Mac Millan
John Vinton

BY Robert W. Eckhoff

ATTORNEY.

Patented Dec. 3, 1946 2,412,018

UNITED STATES PATENT OFFICE

2,412,018

RAILROAD FUSEE

John Vinton, San Francisco, and Douglas MacMillan, Berkeley, Calif.

Application September 20, 1943, Serial No. 503,074

3 Claims. (Cl. 102—37.8)

1

The invention relates to a fusee or flare construction particularly adapted for signaling purposes in the operation of railroads and of trucks. A typical prior art device of this character is shown in Patent 1,327,899.

One type of railway signaling devices consists of a strontium nitrate fusee or flare giving only a visible signal upon burning. To be at all useful in the daylight it is necessary that the strontium nitrate fusee be deposited on the ground in a location having some shade so that the flame from the fusee will be visible to an oncoming train. Even when this is done it is hard to distinguish the fusee flame. To insure that an oncoming train will not overrun the signal several of them are usually employed in the hope that at least one of them will be seen. When it is pointed out that the fusee is usually thrown from a moving train after burning has been initiated the difficulty in placing the fusee where it is readily visible will be further appreciated. The material employed in the fusee burns with a hot flame. As a consequence it presents a very considerable hazard from a fire protection standpoint; numerous grain, grass and forest fires have been traced directly to the use of fusees. The fusee of this invention utilizes a composition giving a smoke signal which is readily visible in daylight and which is nevertheless comparatively cool so that the fire hazard is greatly reduced.

To insure adequate headway is maintained between trains it is desirable that the fusee or flare burn for an extended period of time. The device of the present invention utilizes a minimum of combustible material to provide a burning period of from eight to ten minutes.

The general and broad object of the present invention is to provide a novel smoke fusee construction and composition.

Another object of the present invention is to provide a fusee construction enabling a minimum of combustible composition to be employed to provide a smoke fusee having a relatively long period of effective smoke emission.

The invention includes other objects and features of advantage, some of which, together with the foregoing, will appear hereinafter wherein the present preferred form of device and composition of our invention are disclosed.

In the drawing accompanying and forming a part of this specification.

Figure 1 is a side elevational view of one form of fusee or flare construction of the present invention.

Figure 2 is a side elevation of the device shown in Figure 1 partly cut away to illustrate the construction.

Figure 3 is a section taken along the line 3—3 in Figure 1.

2

Referring to the drawing, the signal device of the present invention comprises an outer container 6. This is shown as cylindrical in section but it may assume any other tubular form. The container includes a bottom 7 which can, if desired, be provided with a spike 8 or other support means if desired. The upper end of the container 6 is closed by a cap 11 held in place by a U-shaped adhesive strap 12 secured over the cap and to the container 6. A friction starting element, indicated by numeral 13, is provided on the outside of the cap and is normally covered and protected by the strap 12. The container is filled with the smoke signaling composition 15. On top of this is placed a pellet of ignition starting material 16 which, upon being rubbed with the friction material 13 on the cap 11, ignites the signaling composition. The cap 11 is spaced from the pellet 16 by a wad 17 of fibrous material which acts as a safety cushion to prevent inadvertent ignition. The composition of a suitable friction starting element is well known in the art, and various compositions can be employed successfully. We have utilized one comprising, by weight, 13 parts each of ferrous sulphide and antimony trisulphide, 21 parts of potassium nitrate and 3 parts of dextrin.

To use the device, tape 12 is broke, cap 11 is removed and wad 17 lifted off the pellet 16. The cap is then reversed in position and its friction element is applied to the friction pellet 16, causing ignition of the pellet and of the upper end of chemical composition. As the pellet is ignited it fuses to the side of the container, substantially sealing the upper end of the container, forcing the gases generated out through the several apertures 21 in the side wall of the container, and permitting release of the colored gas or vapor without ignition and without the gas or vapor having to pass through a hot ash. Usually two opposite rows of holes suffice.

In the form of the device illustrated, container 6 includes apertures 21 in its sidewall with an outer cover wall 22 extending over the apertures. This cover is preferably made of a combustible material such as cellulose nitrate or cellulose acetate which burns away rapidly over each aperture as ignition travels down through the composition in the container. The cover can also be made of a material having a high ignition point such as paper or Cellophane. However, in this case, it is desirable that the area adjacent each aperture be treated with potassium chlorate or other combustion facilitating material to insure that each aperture is uncovered as the composition burns away.

By utilizing a container having smoke emission means which become effective only when the burning composition is adjacent to them, we en-

sure release of the generated smoke or vapor at a point immediately adjacent to the region where the generation occurs. If one attempts to employ smoke emission means which are always open and capable of release, by-passing of the generated smoke can and will occur with the result that at least some of the smoke is forced through the hot ash residue in the container. When this happens, undesirable chemical changes occur in the smoke, generally resulting in its losing color. Because of the difficulty in securing an adhesive bonding satisfactorily to cellulose acetate or nitrate film, the cover wall is ordinarily stopped just short of the cap 11 so that the strap 12 can be secured directly to the tube 6. A short length of ash residue at the top of the tube is not objectionable.

In place of using a separate cover on either the inside or outside of the container, the sidewall of the container can be selectively weakened or selected portions can be made to burn out as the composition burns down in the container. The container 6 can be made of any suitable material. We have used paper successfully, rolling it into a tube and then perforating; if desired, the perforated tube can be unwound and the cover wall material wound in with the paper as an intermediate layer, the tube being then secured with a suitable adhesive.

In practice a signal of the form described will burn about 10 minutes when made with a ⅞" diameter tube 10 inches in length. We have found that the quantity of material in the tube can be decreased and the burning time increased by including an inert tubular member extending centrally in the container. Thus in Figure 2 we have shown central member 23 extending centrally of the container and spaced an equal distance from each side of the container. By including the central member we have found that more smoke emission is secured than when the same quantity of composition is burned in a smaller container but omitting the central member. In addition, the central member assists in retaining the fused ignition pellet and the composition ash or coal so that the gas is forced out through the apertures.

As a suitable signaling material one can employ any suitable smoke compositions. We have had a considerable success, however, with compositions of our invention. To make up a red signal we utilize the following materials in the following weight proportions:

	Parts
Paranitro aniline red	28
Rhodamine	4
Potassium chloride	8⅓
Dextrine	12

The quantity of rhodamine to paranitro aniline red can be varied; however, utilizing the materials in the ratio specified insures a deep red. The greater the quantity of rhodamine the deeper the red.

To make up a yellow smoke, we have also employed the following novel composition of our invention:

	Parts
Coal tar	6
Aurimine yellow O	6
Paranitro aniline yellow	6
Dextrine	6
Postassium chlorate	6

The coal tar should be of the grade which is easily ground and is quite brittle.

It is essential to a smoke composition that the material in the container 6 be in finely divided form and not packed so tightly that it is, in effect, in solid form in the container. If the material is too tightly packed or is in solid form, the gas emitted will be colorless, the gas will surge out and the burning time cannot be made uniform and, finally, an extended burning time of about six or more minutes cannot be secured from a small mass of composition.

This is a continuation in part of our application Serial No. 414,034, filed October 7, 1941, by us with Albert Paiva, Patent No. 2,398,545, issued April 16, 1946.

We claim:

1. A fusee or flare consisting of an elongated tubular container having an open end and an outer wall in which are formed a plurality of spaced perforations, a porous colored gas evolving composition filling said container and adapted to burn therein for a substantial time period from one end to the other end of the container, said composition forming a substantially solid mass of ash upon ignition in said container, sealing off unburned composition from said end and forcing gas evolved from the burning portion of said composition to issue through those perforatios adjacent to the burning portion, and a friction ignitable pellet positioned over said open container end, said pellet upon ignition inducing burning of said composition and sealing over said open end to force initial gas emission through the perforate side wall.

2. A device as in claim 1 wherein an outer cover of a combustible material is provided over the perforations in the container wall to burn away with the composition.

3. A device as in claim 1 wherein an outer cover of cellulose acetate is provided over the perforations in the container wall to burn away with the composition.

JOHN VINTON.
DOUGLAS MacMILLAN.