United States Patent

[11] 3,601,053

[72] Inventors **Kenneth J. Grall;**
Ambrose A. Fulkerson, both of Evansville, Ind.

[21] Appl. No. **869,528**
[22] Filed **Oct. 27, 1969**
[45] Patented **Aug. 24, 1971**
[73] Assignee **The United States of America as represented by the Secretary of the Navy**

[54] **SIGNAL PROJECTILE CONFIGURED FOR IMPROVED PENETRABILITY OF FOLIAGE**
4 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **102/32,** 102/37.6, 102/66, 102/90
[51] **Int. Cl.** **F42b 13/44**
[50] **Field of Search** 102/32, 37.6, 66, 87

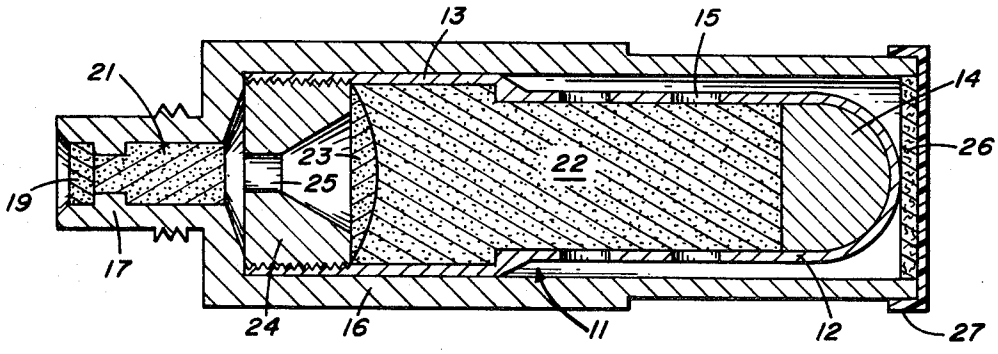
[56] **References Cited**

UNITED STATES PATENTS

1,376,316	4/1921	Chilowsky	102/66
2,096,698	10/1937	Lowy et al.	102/66
2,446,082	7/1948	Dixon	102/66
3,044,360	7/1962	Stefan et al.	102/37.6
3,431,852	3/1969	Fowler	102/32

Primary Examiner—Robert F. Stahl
Attorneys—Edgar J. Brower, H. H. Losche and Paul S. Collignon

ABSTRACT: A signal projectile having an outer container adaptable for mounting to a launching projector and an inner container having a quantity of pyrotechnic material therein for generating a smoke trail when the inner container is launched from the outer container. The inner container has a stepped configuration and a weighted forward end to permit passage of the inner container through jungle canopy.



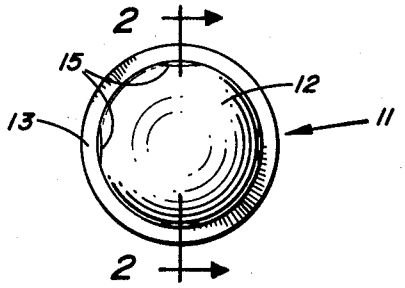


FIG. 1

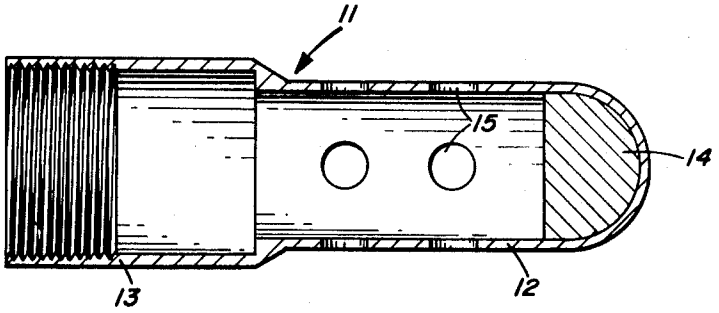


FIG. 2

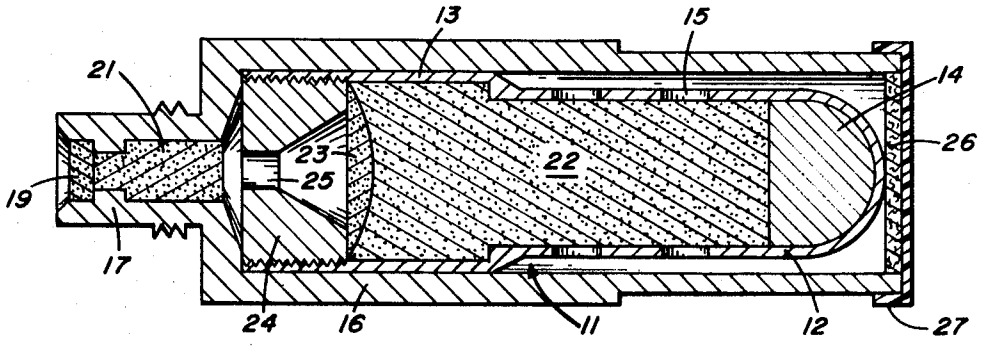


FIG. 3

INVENTORS
KENNETH J. GRALL
AMBROSE A. FULKERSON

BY H. H. Loschke
Paul S. Collignon

ATTORNEYS

SIGNAL PROJECTILE CONFIGURED FOR IMPROVED PENETRABILITY OF FOLIAGE

BACKGROUND OF THE INVENTION

The present invention relates to a signal projectile and more particularly to a signal projectile which can be fired from a hand-held launcher and which is capable of penetrating a jungle canopy.

Many varieties of flares and flare guns are used, particularly by the military, for signalling. Small hand-held launchers are carried by some military personnel, particularly aircraft pilots, to facilitate signalling when they need to show their position on the ground or in water. One such hand-held launcher and flare cartridge is shown in U.S. Pat. No. 3,044,360, which issued Dec. 1, 1960, to Russell O. Stefan and Anton G. Lang. In this patent there is shown and described a flare gun equipped with a flare cartridge. The flare cartridge has a die-formed metal body which includes a thin cylindrical gun barrel **48** which is open at its upper end and has at its lower end a thin head from which an externally threaded nipple extends. This nipple has a bore in which a primer cap is seated. The flare cartridge also includes a flare projectile which includes a thin cylindrical metal casing which is closed at its upper end and open at its bottom end. A solid powder charge and solid flare charge are pressed in the flare cartridge with the solid powder charge being adjacent the primer. The flare charge is selected from chemicals which will produce different colors when ignited and burn with a bright, hot flame.

In U.S. Pat. No. 3,102,477, which issued Sept. 3, 1963, to Russell O. Stefan and Anton G. Lang, there is shown a rocket signal device similar to the above-described patented device. In this later dated patent, however, the described device has a fuse charge which is ignited in a manner to delay its burning and thus assure that a substantial portion of the mass of the fuse will remain unconsumed during a considerable portion of the upward flight of the projectile. This delay feature contributes to the momentum aiding in the ascent of the projectile and also defers the ignition of the signal charge until the projectile has reached an altitude where it will be an effective signal.

SUMMARY OF THE INVENTION

The present invention relates to a signal projectile which can be fired from a hand-held launcher, and the projectile is so that it is capable of penetrating a jungle-type canopy and producing a smoke trail visible for 400 feet or more under daylight conditions. An outer signal tube, which is adaptable for mounting to a flare gun, is provided and an inner signal carrier is positioned within the outer signal tube. When the flare gun is fired the outer signal tube remains with the flare gun and the inner signal carrier is projected and emits a black smoke trail.

The outer diameter of the signal carrier is stepped and the forward end is weighted to permit passage of the carrier through a jungle canopy. This stepped design and weighted end also optimizes the center of gravity—center of pressure relationship for stable flight characteristics of the signal. This increased stability permits a reduced powder charge to be used for launching and thus allow the signal to be fired from a hand-held projector.

Another significant design feature of the signal carrier is a perforated body at the forward end which provides a controlled rate of burning of the smoke formulation. When the signal carrier approaches the peak of the intended flight trajectory, the smoke is rapidly emitted through perforations causing a dense concentration of black smoke at that point. A magnesium closure plug is provided at the aft end of the signal carrier to insure proper ignition of the smoke composition. Although ignition of the smoke composition can be obtained without a closure plug, frequently chunking of the smoke composition will occur while the signal carrier is traveling through the jungle canopy thus separating the ignited surface from the rest of the smoke composition. The closure plug traps the ignited surface inside the signal carrier and reliable ignition is assured.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is an end view of a signal carrier;

FIG. **2** is a sectional view taken on line **2—2** of FIG. **1**; and

FIG. **3** is a sectional view showing a preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, there is shown in FIGS. **1** and **2** a signal carrier **11** that has a reduced diameter portion **12** at the forward end and an enlarged diameter portion **13** at the aft end. The forward end of reduced diameter portion **12** is hemispherical and a weight **14** of heavy material, such as lead, is positioned in this forward end. The stepped design of signal carrier **11**, along with the weight **14**, provide increased ability for the carrier **11** to pass through a jungle canopy when fired from a projector. A plurality of holes **15** are provided in the reduced diameter portion **12**, and it is through these holes that smoke is emitted when the signal carrier is at the peak of its flight trajectory. By way of example, when signal carrier **11** is designed to carry about 9.5 grams of smoke composition, eight holes of 5/32-inch diameter provide the optimum concentration of smoke at the top of the flight trajectory.

Referring now to FIG. **3** of the drawing, there is shown an outer signal tube **16** that has a reduced diameter portion **17** for attaching to a flare gun of the type shown in the above-mentioned U.S. Pat. Nos. 3,044,360 and 3,102,477. A primer **19** and a quantity of black powder **21** are provided in reduced diameter portion **17** for propelling signal carrier **11**. Signal carrier **11** contains a quantity of smoke composition **22** and an igniter charge **23**. By way of example, smoke composition **22** might be comprised, by weight, of about 64 percent of powdered magnesium, about 30 percent of strontium nitrate, about 5 percent of dechlorane, and about 1 percent of powdered polyethylene, and the igniter charge **23** might be comprised of, by weight, of about 74 percent of potassium nitrate, about 25 percent of powdered amorphous boron and about 1 percent of a suitable binder. An orifice plate **24** is threadedly attached to the aft end of signal carrier **11** and facilitates the retention of smoke composition **22** within carrier **11**, particularly when the carrier **11** is being subjected to shock incurred while passing through a jungle canopy. An orifice **25** is provided in plate **24** for emitting smoke during the upward travel of carrier **11**. Signal carrier **11** is retained within tube **16** by means of felt disc **26** and plastic cap **27**, which might be of the heat shrinkable type.

OPERATION

In operation, reduced diameter portion **17** is attached to a flare gun and, when the flare gun is triggered, a firing pin strikes and detonates primer **19** which in turn ignites powder **21**. The explosion of powder **21** ignites igniter charger **23** and also ejects inner carrier **11** from outer signal tube **16**. Igniter charger **23**, in turn, ignites smoke composition **22**. Assuming that the inner carrier was launched in a vertical direction, smoke is emitted through orifice **25** during the upward travel and by the time the inner carrier reaches its designed peak altitude, a quantity of composition **22** has been consumed and the burning is in the vicinity of holes **15**. Smoke is then rapidly emitted through holes **15** to provide a dense concentration of black smoke.

We claim:

1. A smoke signal carrier adaptable for launching from a hand-held projector and configured to defeat a jungle canopy comprising,

a cylindrical container having a forwardly extending reduced diameter portion terminating in a hemispherically shaped leading edge,

a weight positioned in the forward end of said reduced diameter portion,

a plurality of holes extending around the periphery of said reduced diameter portion,

a quantity of smoke composition within said cylindrical container, and

an orifice plate closing the aft end of said cylindrical container and having an orifice for emitting smoke during flight of said signal carrier.

2. A smoke signal carrier as set forth in claim **1** wherein said smoke composition is comprised of about 64 percent of powdered magnesium, about 30 percent of strontium nitrate, about 5 percent of dechlorane and about 1 percent of powdered polyethylene.

3. A smoke signal carrier as set forth in claim **1** having an igniter charge for igniting said smoke composition.

4. A smoke signal carrier as set forth in claim **1** wherein said weight is lead.