

1

3,202,099

## FLARE CARTRIDGE

Austin M. Wortley, Jr., Devon, and Barry Rothman, West Chester, Pa., assignors to Penguin Associates, Inc., Malvern, Pa., a corporation of Pennsylvania

Filed Oct. 16, 1963, Ser. No. 316,580

2 Claims. (Cl. 102—37.6)

This invention relates to aerial flare devices, and more particularly concerns a flare cartridge which is adapted for use with a pen-type flare launching device.

It is an object of this invention to provide a flare cartridge which is of improved construction and which gives superior results in use.

Other objects and advantages of this invention, including its simplicity and economy, as well as the ease with which it may be adapted to existing equipment, will further become apparent hereinafter and in the drawings, in which:

FIG. 1 is a view in top plan of flare launching device and a flare cartridge constructed in accordance with this invention;

FIG. 2 is a view in section taken as indicated by the lines and arrows 2—2 which appear in FIG. 1; and

FIG. 3 is a view in longitudinal section, and on an enlarged scale, of the flare cartridge.

Although specific terms are used in the following description for clarity, these terms are intended to refer only to the structure shown in the drawings and are not intended to define or limit the scope of the invention.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, there is shown a flare cartridge 11 which comprises an elongated cartridge casing 12 with a primer 13 mounted at one end. Primer 13 is preferably a shotgun shell primer cap, known in the art as a battery-cup primer.

A cup-shaped pellet casing 14 is positioned in cartridge casing 12 with its open end 15 facing primer 13.

A flare pellet 16 is contained in pellet casing 14, and resilient ignition means are pressed on top of pellet 16 for cushioning the shock of the exploding primer 13 and for igniting the flare pellet material. The resilient ignition means includes a layer of ignition mix 17 pressed on top of flare pellet 16, and a cord 18 covered with black gunpowder pressed into ignition mix layer 17.

Open end 15 of pellet casing 14 is crimped over to lock in place all the material within pellet casing 14, and thereby prevent the ignition means from separating from flare pellet 16 in order to insure reliable ignition of the pellet. A roll crimp of end 15 is illustrated in the drawings, but a star crimp may be used if desired.

A flash-hole expansion chamber 21 is formed in cartridge casing 12 between primer 13 and crimped open end 15 of the pellet casing. At the other end of the flare, a rubber shock-absorbing plug 22 is mounted with one end adjacent the bottom of the pellet casing, and the other end facing the open end of cartridge casing 12. A sealing layer 23 is applied to the outer end of plug 22. Another sealing layer 24 is applied to the primer end of cartridge casing 12 to seal the primer 13 in the cartridge casing.

On the outside of casing 12, near the primer end of the casing but spaced therefrom, are formed a series of engagement threads 25 which are adapted for quick engagement with a body tube 26 of a flare launching device 27. In previous devices, engagement threads extended all the way to the primer end of cartridge casing 12, but these have been stripped away, thereby eliminating a number of turns previously required to thread flare cartridge 11 into body 26, and reducing the time required for performing this operation. In addition, the stripped

2

portion acts as a guide to thread engagement, thereby facilitating loading of the device under adverse conditions, e.g., at night or in inclement weather.

The flare launching device 27 illustrated in FIGS. 1 and 2 includes body tube 26, and a knurled cap 28 that acts as a base for compression spring 31 which is positioned within body tube 26. Spring 31 acts against the bottom of a firing pin 32 that includes a striking end which is adapted to enter the recess in retainer nut 34 to strike the primer 13 and thereby launch the flare. Body tube 26 is provided with a firing slot 35 which extends longitudinally, and a slanting cocking and safety slot 36 which extends from the rear of firing slot 35 at an acute angle thereto. Slot 36 terminates in a cocking and safety notch 37, and a short safety detent slot 38 extends therefrom in a longitudinal direction and ends in a safety detent notch 41.

A trigger screw 42 is screwed into a recess in firing pin 32 and extends through the slots in body tube 26.

An eye bolt 43 is swivelly mounted in cap 28, and a lanyard may be threaded through it and attached to the clothing of the person carrying the flares launching device. The lower end of body tube 26 is knurled so that the device may more easily be handled, even when wearing gloves.

In operation, trigger screw 42 is positioned in cocking and safety notch 37 and flare cartridge 11 is screwed onto the end of tube 26. If device 27 should be accidentally dropped so as to compress spring 31, trigger screw 42 moves directly rearward in safety slot 38 toward safety detent notch 41, and does not move into cocking and safety notch 37.

To fire the flare device 27, trigger screw 42 is moved into and along cocking and safety slot 36 to the rear of firing slot 35. A wiping motion of the thumb is used, not a push of the thumb. Then trigger screw 42 is released, and spring 31 urges firing pin 32 forwardly so that its striking end enters the recess in retainer nut 34 and strikes primer 13 to detonate it. The explosive gases from primer 13 enter flash-hole expansion chamber 21 and ignite the ignition mix layer 17, which in turn ignites the pellet 16. The gas also propels the flare to expel it from cartridge casing 12 into the air where pellet 16 burns with a bright flame, the color of which may be varied by means well known in the pyrotechnic art.

The crimp on pellet casing end 15 locks the ignition mixture in place and prevents it from fracturing and falling apart, and provides additional expansion chamber space.

The flare is assisted in attaining greater height by a rocket effect as the gases from the fast burning ignition mix are expelled rearwardly during the ascent of the flare. Eventually, the flare loses its ballistic stability, and starts to lob end over end.

The length of the cartridge casing 12 is important and is to be noted. It is about twice as long as conventional devices. This greater length provides a pistol and rifle barrel effect that projects the flare to greater height. The seal 24 also aids in preventing the explosive gases from escaping rearwardly instead of exerting full force against the flare.

Also assisting the flare in attaining greater height is the close tolerance between the inside of cartridge casing 12 and the outside of pellet casing 14. In practice, cartridge casing 12 is 1 7/8 inches long, and the tolerance between cartridge casing 12 and pellet casing 14 is two-thousandths of an inch on a side.

Primer 13 is a shotgun or battery-cup primer cap which is larger than the pistol shell caps conventionally used and is self-contained, containing anvil, primer mixture, and cup. It gives greater reliability than the pistol primer used in conventional devices.

Seals 23 and 24 may be of any suitable epoxy resin, and pellet casing 14 is preferably made of aluminum, although it may be made of other materials such as paper. When casing 14 is made of aluminum, it is consumed in the flame and makes the flare burn more brilliantly. Cord 18 may be made of any suitable fuse igniter cord.

It is to be understood that the form of the invention herewith shown and described is to be taken as a presently preferred embodiment. Various changes may be made in the shape, size and arrangement of parts. For example, equivalent elements may be substituted for those illustrated and described herein, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit or scope of the invention as defined in the subjoined claims.

The claimed invention is:

1. A flare cartridge comprising an elongated cartridge casing having an inside diameter with a primer mounted at one end, an annular sealing layer sealing the primer in said cartridge casing, a cup-shaped pellet casing having an outside diameter and positioned in said cartridge casing with an open end facing said primer, said inside diameter being no more than four-thousandths of an inch larger than said outside diameter, a flare pellet contained in the pellet casing, a layer of resilient ignition material mounted on top of the flare pellet, a flash-hole expansion chamber formed in said cartridge casing between said primer and said pellet, an elongated rubber shock-absorbing plug mounted in said cartridge casing with one end adjacent the bottom of said pellet casing, a sealing layer sealing the other end of said plug in said cartridge casing, and engagement threads formed on the outside of said

cartridge casing and spaced longitudinally away from its primer end for quick engagement and prealignment of the threads with a body tube of a flare gun.

2. A flare cartridge comprising an elongated cartridge casing having an inside diameter with a primer mounted at one end, a sealing layer sealing the primer in said casing against moisture, a cup-shaped pellet casing having an outside diameter and positioned in said cartridge casing with an open end facing said primer, said inside diameter being no more than four-thousandths of an inch larger than said outside diameter, a flare pellet contained in the pellet casing, a flash-hole expansion chamber formed in said cartridge casing between said primer and said pellet, a sealing layer sealing the other end of the cartridge casing, engagement threads formed on the outside of said cartridge casing, and means positioned between the threads and the primer end of the cartridge casing adapted to prealign the threads with the body tube of a flare gun, whereby to facilitate the loading of the flare gun under adverse conditions.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

25	3,044,360	7/62	Stefan et al. ....	102—37.6
	3,086,894	4/63	Bagett .....	102—86.5
	3,102,477	9/63	Stefan et al. ....	102—37.6

##### FOREIGN PATENTS

30	652,542	4/51	Great Britain.
----	---------	------	----------------

BENJAMIN A. BORCHELT, *Primary Examiner.*

SAMUEL FEINBERG, SAMUEL W. ENGLE,  
*Examiners.*

Aug. 24, 1965

A. M. WORTLEY, JR., ETAL

3,202,099

FLARE CARTRIDGE

Filed Oct. 16, 1963

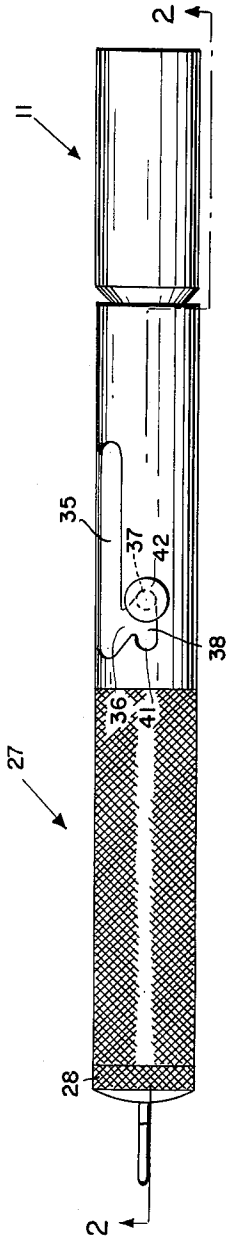


FIG. 1.

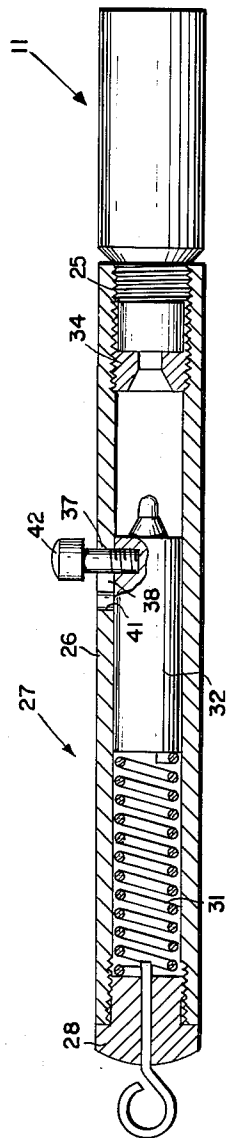


FIG. 2.

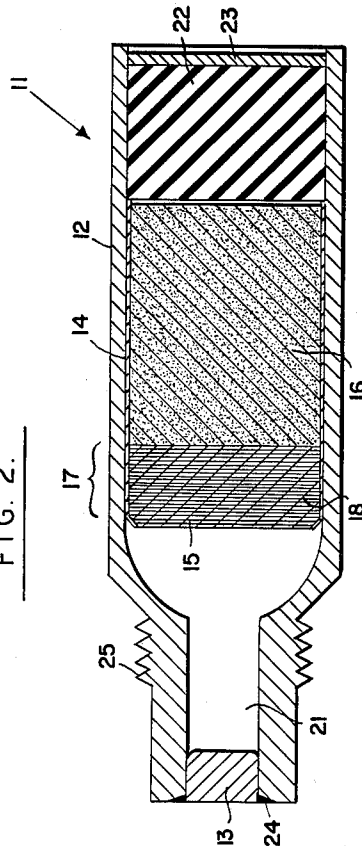


FIG. 3.

INVENTORS  
AUSTIN M. WORTLEY, JR.  
& BARRY ROTHMAN  
BY  
*John F. A. Earley*  
ATTORNEY