

1,326,494.

Patented Dec. 30, 1919.

Fig. 1.

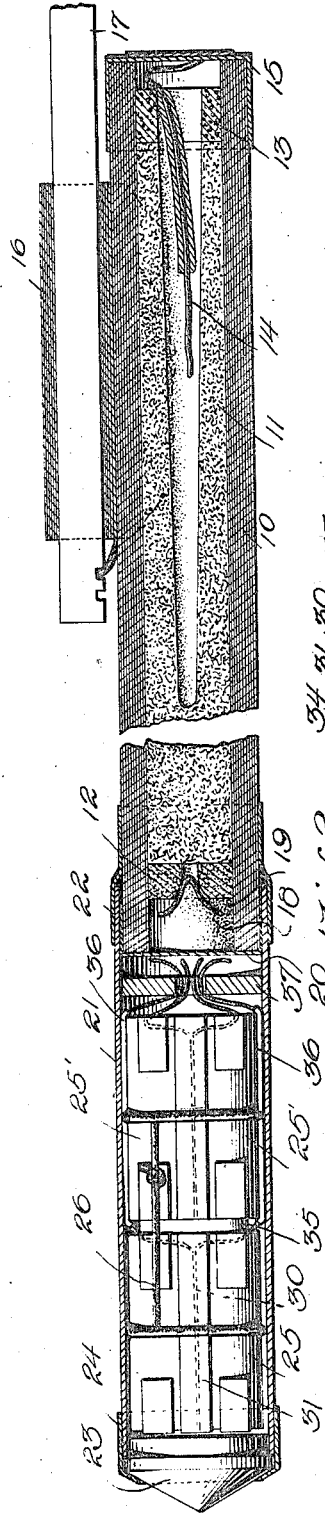


Fig. 2.

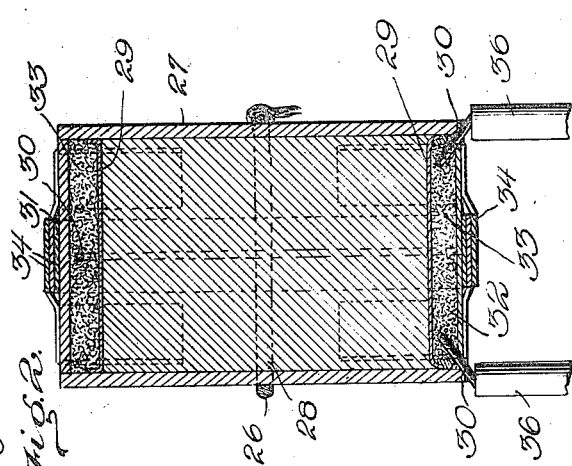


Fig. 3.

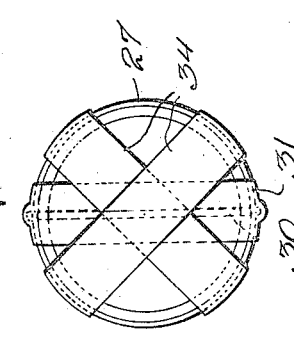
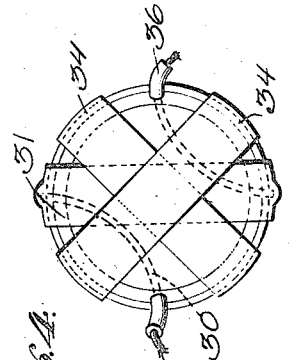


Fig. 4.



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SIGNAL-ROCKET.

1,326,494.

Specification of Letters Patent.

Patented Dec. 30, 1919.

Application filed January 8, 1919. Serial No. 270,235.

To all whom it may concern:

Be it known that I, ROBERT CLYDE GOWDY, a citizen of the United States, residing at Cincinnati, Ohio, have invented new and useful Improvements in Signal-Rockets, (Case B,) of which the following is a specification.

This invention relates to pyrotechnic signals and has particular reference to signals adapted to be employed in military operations for communicating orders and conveying intelligence generally, such, for instance, as the location of an enemy battery, a call for a barrage, etc.

It is a purpose of the present invention to provide an improved smoke rocket which when properly set off in the air will emit a large volume of colored smoke of a density necessary to insure good visibility. In accordance with the present invention, smoke producing cartridges, which form what is herein termed as the "trailer", are incorporated in a rocket which, upon being sent into the air, will discharge the cartridges, preferably at the highest point of flight of the rocket, and the cartridges thereupon being set into operation will emit a large volume or heavy trail of colored smoke while falling through the air. In the present illustrative disclosure of my invention, I describe the smoke as being black, but it is to be understood that the color of the smoke may be varied as desired. The smoke cartridges are entirely reliable in operation and this feature is of great importance in military operations, where in the event that a rocket should not properly operate, disastrous results might follow.

Further objects of the invention are to provide a structure which is simple in its construction and the parts of which may be quickly and readily assembled, so that the devices may be made in large quantities at a relatively low cost.

A further object of the invention is to provide a smoke-producing composition which is characterized by the following features or advantages: a high degree of dispersion of coloring matter upon ignition so that a cloud of the desired visibility is produced by a small weight of coloring material; a chemical reaction which produces smoke rapidly and uniformly so that the trail of smoke will be visible for the desired length of time and will be the desired color;

comparative insensibility to shock and inability except when loose, to be ignited directly from a spark or flash, thus permitting the composition to be handled without great danger while making up the composition or loading the cartridges; and, its stability, it being permissible to let the composition stand in an air tight container for a long time without deterioration.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

To enable others skilled in the art so fully to comprehend the underlying features thereof that they may embody the same in the numerous modifications in structure and relations contemplated by this invention, drawings depicting a preferred form have been annexed as a part of this disclosure and in such drawings like characters of reference denote corresponding parts throughout all the views, of which:

Figure 1 is a sectional view taken longitudinally through the rocket, the trailer being shown in side elevation.

Fig. 2 is an enlarged sectional view taken longitudinally through the assembled "cartridge".

Fig. 3 is an elevational view of the forward end of one of the cartridges of the trailer, and

Fig. 4 is an elevational view of the rear end of the forward cartridge of the trailer:

Referring to the drawings in detail, the numeral 10 designates the main rocket body or casing comprising a tube formed of paper or the like and receiving the usual rocket composition 11, the rocket composition being maintained in place by centrally apertured disks or slugs 12 and 13, formed of clay and pressed into the forward and rear ends, respectively, of the casing 10 after the composition 11 is inserted therein. As is usual, the body of rocket composition 11 has a recess at its rear end into which the end of a rocket fuse 14 extends. The rear end of the casing 10 is closed by a paper cap 15 which, when it is desired to ignite the fuse 14, is torn away. 16 designates the usual stick socket carried by the casing 10 and having a through aperture to receive a rocket stick 17. Within the aperture of the forward clay disk 12 is a discharge fuse 18 which is ignited by the

burning of the composition 11 when the latter has been almost completely consumed and at which time the rocket has almost reached the highest point of its trajectory. 5 The fuse 18 ignites a bursting charge 19 at the forward end of the body 10, this bursting charge being adapted to ignite the cartridges of the trailer hereinafter described, and to shoot said trailer from its container 10 or casing. The forward end of the casing 10 is inclosed by a paper or cloth cap 20 which is burst open when the bursting charge 19 is exploded.

The trailer is mounted within a trailer 15 casing 21, into the rear end of which the forward end of the rocket casing or body 10 telescopes, and to secure the two casings 10 and 21 in assembled position, a strip 22 of paper, fabric, or the like, is pasted 20 about the joint between the two casings. The trailer casing 21 is closed at its forward end by means of a rocket top 23, the forward end of which is conical and this top is secured in place by means of a paper strip 25 24, which is crimped or bent over the edge of the top.

In the present illustrated disclosure of my invention, the trailer is shown as comprising two cartridges, 25 and 25' secured 30 together by an asbestos string 26, as hereinafter described. Each of the cartridges comprises a cylindrical smoke container or case 27, the external diameter of which is less than the internal diameter of the trailer casing 21, so as to fit loosely in the latter. Each of the smoke cases is filled to within short distances of its opposite ends, say one-fourth of an inch, with the smoke composition 28, and while this composition may be 40 composed of various substances depending on the color of smoke desired, in case a black smoke is desired, the composition compounded as hereinafter described is preferably employed. For the purpose of 45 preventing any of the substances from which the smoke composition is compounded from escaping from the smoke case, celluloid partitions 29 are forced into the opposite ends of each case and against the 50 composition, and these partitions are cemented in position so as to form an airtight seal. After the celluloid disks are in position, the middle portion of a piece of fuse or quickmatch 30 of the right length 55 is held in one end, (which will be the forward end), of the smoke case 27 while the two ends are brought down and pasted to the side of the case 27 by means of paper strips 31. The end of the smoke case 60 through which the quickmatch passes is then filled with a starting composition 32 and a disk 33 is positioned on this end of the smoke case and is secured in place by means of strips 34 of cambric, paper, or 65 the like. The ends of the quickmatches

which protrude beyond the rear end of the smoke case are led through the space in the rear end of the case as most clearly shown in Fig. 4, and then this end of the case is filled with a starting composition 70 32 and closed by the disk 33 held in place by the strips 34.

After the two cartridges are completed, they are placed end to end and a felt wadding or disk 35 is interposed therebetween. 75 The ends of the quickmatch of the forward cartridge 25 are of such length as to permit them, after they are threaded through suitable covers 36, to be led longitudinally of the rear cartridge 25' beyond the rear end 80 thereof. The cartridges are connected, as before stated, by means of the asbestos string 26, the string encircling at its opposite ends the middle portions of the cartridges 25 and 25' so that when the trailer 85 is discharged from the trailer casing 21 the two cartridges will fall apart sufficiently to permit smoke to be discharged from both ends of each cartridge.

The four ends of the quickmatches 30 90 are threaded through a central opening in a disk of wadding 37. After the parts of the trailer are assembled as above described, the assembly is pushed into the trailer casing 21, (which has previously been united 95 to the rocket body 10, and which, in effect, forms the head of the rocket), and the top 23 is attached.

To obtain a black smoke, I preferably employ a mixture composed of anthracene, 100 magnesium powder, and a compound called hexachlorethane, mixed in the following proportions, by weight:

Hexachlorethane	-----26 parts.	105
Magnesium powder	----- 8 parts.	
Anthracene	----- 8 parts.	

The principal action of this composition is between the magnesium and the hexachlorethane, this reaction being of itself very 110 violent and producing a white smoke. The anthracene slows down the reaction and at the same time colors the smoke black. The speed of the reaction may be controlled by varying the anthracene content but decreasing 115 the anthracene shortens the time of burning, and tends to lighten the color of the smoke, while increasing the proportion of anthracene increases the time of burning but does not make the smoke appreciably 120 blacker.

The use of anthracene in this composition to blacken the smoke is particularly advantageous for the reason that upon ignition of the composition, the anthracene, which upon 125 carbonization imparts color to the smoke, seems to be volatilized, and not merely mechanically dispersed. Since the anthracene probably becomes volatilized a high degree of dispersion of the coloring material is ob- 130

tained, so that a cloud of the desired visibility is produced by using a small amount of coloring material. The smoke composition does not deteriorate upon standing, when contained in an air tight receptacle, and it is comparatively insensible to shock.

The starting powder 32 for igniting the smoke composition may be composed of any suitable ingredients, but I have found that a composition composed of reduced iron 10 parts and potassium nitrate 6 parts, may be employed to advantage.

When it is desired to give a signal by employing my improved rocket, the paper cap 15 at the rear end of the rocket body is broken through, and the fuse 14 is pulled outwardly. The rocket is then set at the correct angle and the fuse 14 lighted. Therefore, due to the burning of the rocket composition 11, the rocket will shoot up into the air, and when the rocket has reached the maximum height of its trajectory and the trailer casing 21 is still pointed upwardly, the burning of the composition 11 adjacent the fuse 18 ignites said fuse, thus discharging the bursting charge 19. The explosion of the bursting charge breaks open the cap 20 at the forward end of the rocket body and ignites the ends of the quickmatches or fuses 30, and due to the expansion of the gases generated by the explosion, the trailer is blown forwardly out of the trailer casing 21, the force of the explosion being sufficient to break away the rocket top 23. After the trailer is discharged from the rocket casing, the two cartridges 25 and 25' will fall apart as far as the asbestos string 26 will permit. In the meantime the burning of the quickmatches has ignited the starting compound 32 at the opposite ends of each of the cartridges. Upon ignition of the starting compound, the end caps or disks 33 are broken away, and the celluloid partitions 29 burned, so that the starting compound can ignite the smoke mixture 28. As the trailer falls through the air, black smoke will be emitted from both ends of each of the cylinders, leaving a trail of smoke which will be visible from distant points.

What I claim is:

1. A smoke cartridge comprising a case, a body of smoke composition therein, a body of starting composition at each end of the case, and means for igniting said bodies of starting composition.

2. A smoke cartridge comprising a case, a body of smoke composition within the case, a body of starting composition at each end of the case a destructible closure at each end of the case, and a fuse between the bodies of

starting composition at opposite ends of the case.

3. A smoke cartridge comprising a case, a body of smoke producing composition therein, a body of starting composition, a combustible seal between the bodies of smoke composition and starting composition, and a destructible closure at the end of the case.

4. A smoke cartridge comprising a case, a body of smoke producing composition therein, a body of starting composition at each end of the case, a celluloid seal between the body of smoke producing composition and each body of starting composition, a destructible closure at the opposite ends of the case, and a fuse between the bodies of the starting composition.

5. A smoke producing trailer comprising a plurality of smoke producing cartridges each adapted when ignited to emit smoke from both of its ends, and a tie member between the cartridges.

6. A trailer comprising a plurality of smoke producing cartridges placed end to end, each of said cartridges being adapted to emit smoke from both of its ends, a fuse for each cartridge and leading to a common point of ignition, and means for tying the several cartridges together.

7. A rocket comprising a casing, a rocket composition therein, a bursting charge adjacent one end of the rocket composition and adapted to be ignited by the latter, a destructible partition confining said bursting charge, and a trailer in the casing adapted to be discharged therefrom upon bursting of said charge and having a fuse adapted to be ignited when said charge explodes.

8. A rocket comprising a body portion composed of a main tubular rocket casing of considerable strength and an extension or trailer casing of relatively small strength, a rocket composition in the main casing, a bursting charge at the forward end of the main casing and adapted to be ignited by said rocket composition, a destructible cap on the forward end of the main casing and adapted to be burst open when the bursting charge explodes, a trailer fitting loosely in said trailer casing and having a fuse, a portion of which is in close proximity to said destructible cap so as to be ignited upon explosion of said bursting charge, and a rocket top secured to the forward end of the rocket body and adapted to be ripped therefrom upon discharge of the trailer from the casing when the bursting charge explodes.

Signed at Washington, District of Columbia, this 12th day of November, 1918.

ROBERT C. GOWDY. [L. s.]