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3,044,360 FLARE GUN

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1 Claim. (Cl. 89—1)

This invention relates to flare guns and it has as a particular object, the provision of a flare gun about the size of a pencil.

It is an object to provide such a flare gun which has a clip and may be carried in a pocket of the clothing just like a pen or pencil and with equal convenience and yet be available any time for instant use as a flare gun when the need for this arises.

Heretofore flare guns available on the market and used on ships, airplanes and by the military, have been sizeable and handled a cartridge as large or larger than a 12-gauge shotgun cartridge. The flare charge was propelled from these guns several hundred yards into the air. In the wide open spaces where the visibility of the flare at very great distances is highly desirable, this range of the flare charge required the use of flare equipment too large for convenient use in many situations where a much less flare range would produce a signal quite adequate for the communication desired to accomplish thereby.

It is accordingly an object of the invention to provide a simple, relatively light, compact and inexpensive flare gun suitable for use by a sportsman in the air, or at sea, or in the mountains, or by military and naval personnel generally or by airline crews, which will fire a flare charge approximately one hundred yards into the air.

Another object of the invention is to provide such a flare gun equipped with flare cartridges which may be inexpensively produced and sold.

Still another object is to provide such a flare gun with cartridges for firing flares of different colors, which cartridges may be readily distinguished as to color by the sense of touch, thus facilitating the sending of a prescribed color signal while in complete darkness.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which

FIG. 1 is an elevational view drawn to full scale of a preferred embodiment of the invention with the cocking piece of the gun positioned in the safety notch thereof and with a cartridge applied to said gun.

FIG. 2 is an enlarged sectional view taken on the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary enlarged elevational view of the barrel of the invention showing the cocking piece guide slot as well as the safety notch formed in one edge and the cocking notch as formed in opposite edges thereof.

FIG. 4 is a cross-sectional view taken on the line 4—4 of FIG. 2.

FIG. 5 is a cross-sectional view taken on the line 5—5 of FIG. 2 with the cocking piece and firing pin rotated in the barrel to bring the cocking piece into its longitudinal guide slot.

FIG. 6 is a perspective view at a reduced scale of one of the series of flare cartridges of the invention, this cartridge being preferably of the style used for producing a white flare.

FIG. 7 is a view similar to FIG. 6 of a slightly different cartridge of said series preferably used for producing a green flare.

FIG. 8 is a view similar to FIG. 7 of another different

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style of cartridge of said series, preferably used for producing a red flare.

FIG. 9 is a perspective view of a plastic cap used to cover the primer cap of any of the flare cartridges used with the invention until the time when this is applied to the gun.

FIG. 10 is a fragmentary longitudinal sectional view of a modified form of the flare gun of the invention with the cocking piece thereof disposed in the longitudinal guide slot as when the gun is being fired.

Referring specifically to the drawings, the invention is there disclosed as embodied in a flare gun 10 which, when armed, embraces a flare cartridge 11.

The flare gun 10 includes a firing pin guide tube 12 which may be manufactured of a section of cylindrical metal tubing about $3\frac{1}{2}$ inches long, $\frac{7}{16}$ inch in outside diameter and with a wall thickness of $\frac{3}{32}$ of an inch. The tube 12 thus has a quarter-inch bore. The tube 12 is tapped at its upper and lower ends for a reason to be made clear hereinafter. The upper end of tube 12 is also counterbored at 13 and a notch 14 is provided in the wall of the tube at its lower end. The wall of tube 12 also has a pair of diametrically opposed aligned holes 15 just below the threads provided in the upper end of the tube in which a cylindrical stop pin 16 is permanently installed as by a drive fit between the pin and the holes 15. Extending downward from a point a slight distance below the pin 16 is a longitudinal cocking piece guide slot 17. Shaped from the left edge of slot 17 a short distance below its upper end is a cocking piece safety notch 18 having an upwardly extending recess 19 the purpose of which will be made clear hereinafter. Formed in the right and left edges of slot 17 at the lower end of the latter are cocking notches 20 the purpose of which will be explained hereinafter.

The lower end of tube 12 is closed by a closure 25 of the same external diameter and having a threaded plug 26 which screws into the lower end of the tube there being an annular radial shoulder 27 formed on the closure between said plugs and the external portion of the closure. The plug 26 has a spring guide stem 28 disposed coaxially therewith.

Compressed between the lower end of tube 12 and the annular shoulder 27 is the flat mounting ring 29 of a pocket clip 30, the ring 29 having a tit 31 die-formed therein which extends into the notch 14 in the lower end of tube 12 and thus prevents rotation of the ring 29 when the closure 25 is screwed into place in the tube 12.

Slidably confined within the bore 32 of the tube 12 is a cylindrical firing pin 33. This pin has a tubular skirt 34 into which an expansive coil spring 35 extends so that opposite ends of this spring bear against the plug 26 and the firing pin 33. Formed transversely in the firing pin 33 is a tapped hole 40 into which is screwed the threaded stem 41 of a cocking piece 42. The hole 40 has a restricted terminal portion 43 against which the inner end of screw 41 is forced in order to permanently install the cocking piece 42 in the firing pin 33 with the flat head 44 of the cocking piece disposed in a plane perpendicular to the tube 12.

Provided on the upper end of the firing pin 33 is a striker 45 which comprises a short pin about $\frac{1}{16}$ of an inch in diameter. This is mounted in a vertical plane which includes the axis of the firing pin 33 and is perpendicular to the axis of the stem 41 of the cocking piece 42. The length of the striker 45 is such that when the cocking piece 42 is positioned as shown in FIG. 5 and the firing pin 33 allowed to respond to the expansive energy of the spring 35 to move upwardly into contact with the stop pin 16, the striker 45 will extend to one side of and above said stop pin as shown in broken lines 46 in FIG. 2.

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The flare cartridge 11 has a die-formed metal body 47 which includes a thin cylindrical gun barrel 48 which is open at its upper end and has at its lower end a thin head 49 from which an externally threaded nipple 50 extends downwardly, this nipple having a bore 55 with a counter-bore 56 at its lower end.

The bore 55 is of a diameter which snugly receives a copper-cased primer cap 57 having an external flange 58 which fits into the counterbore 56 thereby limiting the movement of the cap into the bore 55 to that which leaves the lower end of the cap 57 flush with the lower end of the nipple 50. The flare cartridge 11 also includes a flare projectile 59 which includes a thin cylindrical metal casing 60 which is closed at its upper end by a wall 61 and is open at its bottom end, said casing being of an external diameter which loosely fits into the shell 48. Before the projectile 59 is inserted into the shell 48, the casing 60 is turned open-end up and a solid flare charge 62 and solid powder charge 63 are successfully pressed into the casing so as to produce a concave lower surface 64 on the powder charge as shown in FIG. 2.

After the projectile 59 is inserted into the flare gun barrel 48, a cardboard disk 65, which snugly fits the barrel, is forced into the upper end of the latter against the projectile 59 and a sealing coat of 70 of liquid plastic material is applied to the disk 65 and mouth portion of the shell 48 to hermetically seal the projectile 59 in the shell 48, when this hardens.

The flare charge 62 is selected from chemicals which will produce different colors when ignited and burn with a bright, hot flame. Thus a set of cartridges 11 are made to produce a series of flares which for instance may include the colors green, red, and white. Each flare cartridge 11 is coated on the outside with a dye of a color corresponding with the color of the flare which will be produced by the flare projectile 59 contained therein. To facilitate selecting in the dark among the flare cartridges 11 one might have in his pocket, a cartridge which will produce a flare of a given color, the gun barrel 48 of each cartridge 11 which is packed to produce a flare of a given color will be exteriorly formed so that it can distinguished by the sense of touch from cartridges packed to produce flares of other colors. Thus, for convenience, the flare 11 which is packed to produce a white flare is completely cylindrical as shown in FIG. 6; while the flare cartridge packed to produce a green flare has a single rib 71 formed along the shell 48 of the cartridge as shown in FIG. 7; while a flare cartridge 11 packed to produce a red flare is provided with two flanges 71 as shown in FIG. 8, with these in diametrically opposed relation. For still other colors, the flare cartridges 11 may be distinguished by still different arrangements of flanges 71 which can be readily identified in the dark by the sense of touch.

To prevent accidental detonation and perfect the sealing of the cartridge 11, each of the flare cartridges 11 are marketed with the nipple 50 thereof covered by a plastic cap 72 as shown in FIG. 9. It is thus necessary before applying any of the flare cartridges 11 to the flare gun 10 to unscrew the cap 72 from the nipple 50 of that cartridge.

Operation

The flare gun 10 is shown in FIG. 1 with the cocking piece 42 confined in the safety notch 18 and impelled upwardly into the recess 19 of that notch so as to secure the gun 10 against accidental firing resulting from rotation of the firing pin 33 which would bring the stem 41 of the cocking piece into the longitudinal slot 17. When a flare cartridge 11 has been applied to the gun 10 as above disclosed, the cocking piece 42 may be rotated out of the notch 18 into the slot 17 and then pulled downwardly to the lower end of the latter slot, and then, if it is desired to fire the gun 10 at once, the cocking piece 42 is simply released allowing the spring 35 to propel the firing pin 33 upwardly to its upward limit where it bangs against and is halted by the stop pin 16. This extends the strike 45

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upwardly into its broken line position 46 causing it to penetrate the primer cap 57 and fire the gun. The flame from the primer cap 57 ignites the powder charge 63 at the lower end of the flare projectile 59 and the gas produced by the sudden burning of this charge propels the flare projectile 59 from the flare gun barrel 48 of the flare cartridge 11. The force of this is of course confined until adequate to rupture the plastic seal 70.

The heat generated by the explosion of the powder charge 63 in the firing of the flare gun 10 ignites the flare charge 62 so that this burns throughout the ascent of the projectile 59 and through a major portion of its descent but is timed to burn out about a hundred feet before it reaches the ground.

The cocking notches 20 are provided to retain the cocking piece 42 at the lower end of slot 17 with the spring 35 fully tensioned for a short time only before firing the flare gun. With the cocking piece positioned in one of these notches, the gun 10 is said to be cocked, and when it is desired to fire the gun the cocking piece 42 is merely engaged so as to shift this out of the notch 20 occupied by it so as to be released from restraint by the latter which occurs of course as soon as the cocking piece stem 41 moves opposite the lower end of the slot 17. Thus free from restraint, the firing pin 33 is impelled by the spring 35 to its upward extreme position where it strikes the pin 16 and is halted thereby with the striker 45 detonating the cap 57.

It is to be noted that the stop pin 16 not only forms a breech for the primer cap 57, preventing its being forced out of the bore 55 by the internal gas pressure thereagainst when the gun is fired, but this pin also serves as a limitstop for absorbing the full impact of the kinetic energy accumulated by the firing pin 33 during its upward travel under the impulse of spring 35. The pin 16 not only serves this dual function but permits the guide tube 12 to be made of standard tubular stock.

It is to be noted that the flare gun 10 represents an extreme simplification of what is ordinarily considered necessary in a flare gun. For instance the handle of an ordinary flare gun is omitted and the flare gun 10 is held by the firing pin guide tube 12. The permanent gun barrel, which is ordinarily considered essential, is omitted and a flare cartridge is provided which contains within itself an external cylindrical barrel 48 which serves as a gun barrel for the flare gun 10. Strangely enough, the cartridge 11 which thus incorporates within itself the flare gun barrel can be made more cheaply and sold at a lower price than conventional flare gun cartridges.

Referring now to FIG. 10, a flare gun 100 is shown therein which is identical with the flare gun 10 excepting that it incorporates a modified means for assembling the cocking piece with the firing pin of the gun. The gun 100 has a firing pin 101 having a smooth transverse bore 102 and an axial bore 103 which connects at its upper end with bore 102 and at its lower end with an axial counterbore 104 formed within the skirt 105 of the firing pin 101. The firing pin 101 has a striker 106 and a cocking piece 107 the step 108 of which extends into the bore 102 and has a hole 109 which receives a locking pin 110 having a head 111 and which extends through hole 103 into the hole 109. The head 111 is engaged by spring 35 thereby holding the pin 10 in the hole 109 and locking the cocking piece 107 to the firing pin 101. Also embodied with the pin 110 and head 111 is a spring guide stem 112 which, in the flare gun 100, performs the function of keeping the spring 35 straight during the operation of the gun and renders the guide stem 28 unnecessary so that the latter is omitted in the gun 100.

Apart from the differences noted, the flare gun 100 is constructed in identically the same manner as the flare gun 10 and its mode of operation is identical with that of the preferred embodiment of the invention.

We claim:

1. A pyrotechnic signal launching gun adapted to be held

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upright for firing an expendable signal cartridge having a percussion cap and mounted axially on the upper end of said gun, the gun comprising: a cylindrical tube having an outside diameter within the order of approximately one-half inch; a cylindrical firing pin slidable within said tube; a striker on the upper end of said firing pin; means provided on the upper end of said tube for inter-engaging with a cartridge to secure said cartridge temporarily on said end of said tube in coaxial relation therewith and with said percussion cap exposed to detonation by said striker; a plug closing the lower end of said tube; a coiled expansion spring compressed in said tube between said plug and said striker, there being a firing slot formed longitudinally in a portion of said tube, said slot having a safety notch formed laterally therefrom adjacent to but spaced a short distance from the upper end of said slot, said slot also having a cocking notch formed laterally therefrom at its lower end; a cocking piece extending radially from an upper end portion of said firing pin and outwardly through said slot, said cocking piece being manipulable into said safety notch where it holds said

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striker out of contact with the percussion cap of a cartridge applied to said gun, said cocking piece also being manipulable along said slot to increase the compression of said spring and then into said cocking notch to restrain said spring under a high degree of compression, the upper end of said slot allowing said cocking piece to travel freely along said slot under the impulse of said spring, after said cocking piece has been dislodged manually from said cocking notch, until said striker engages and detonates said percussion cap.

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July 17, 1962

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FLARE GUN

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FIG. 1.

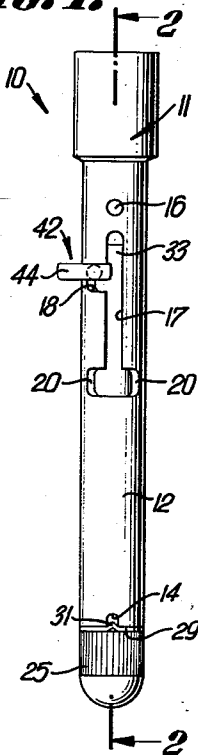


FIG. 2.

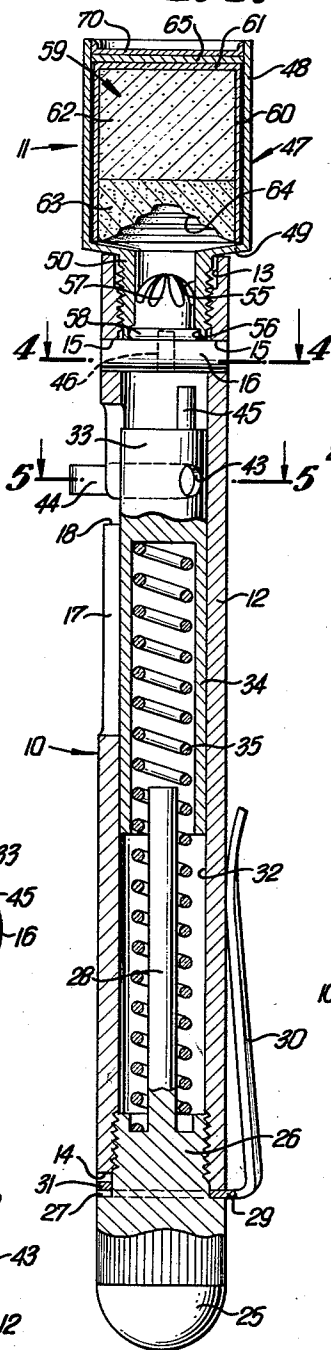


FIG. 3.

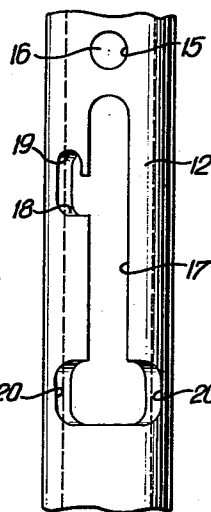


FIG. 6.

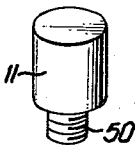


FIG. 7.

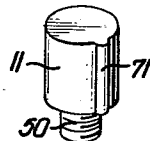


FIG. 8.

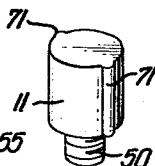


FIG. 10.

