

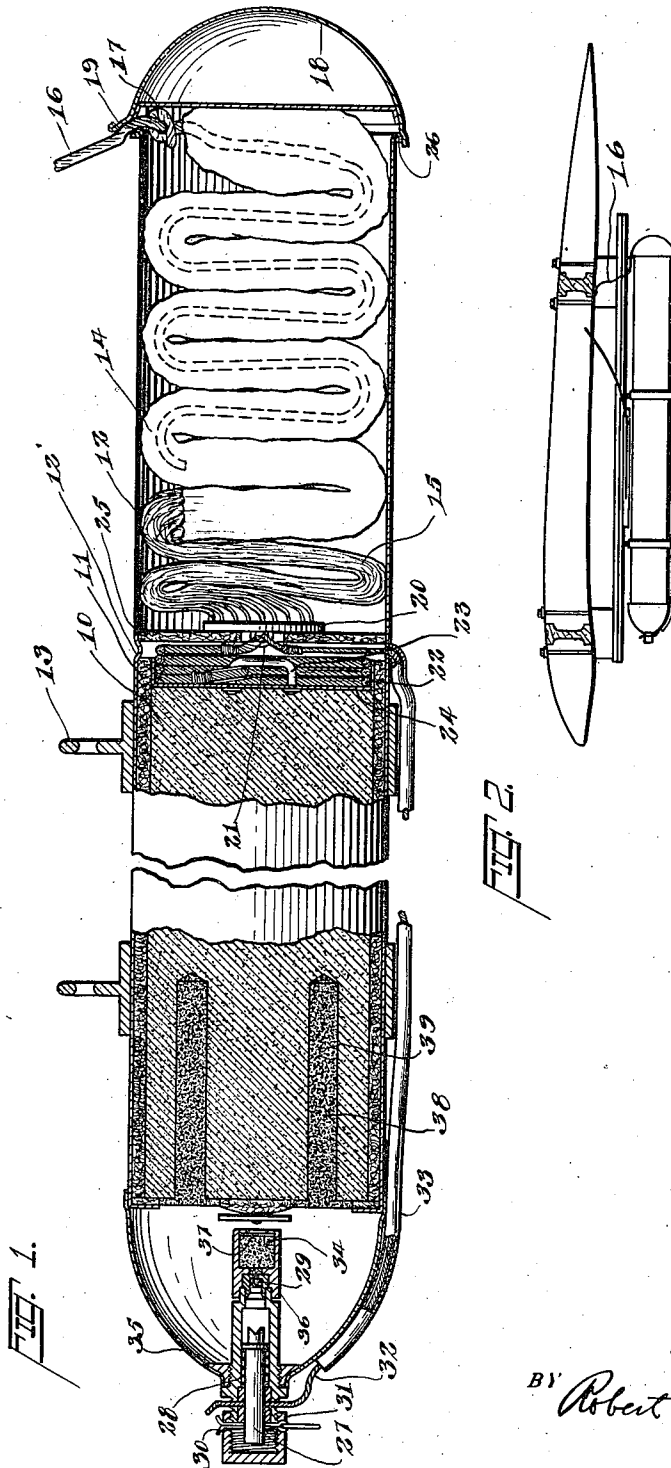
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PARACHUTE FLARE

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PARACHUTE FLARE.

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This invention relates to flares and more particularly to parachute flares adapted for use in night flying for lighting up the ground when landing, or for lighting up the ground in a similar way to facilitate bombing by aircraft.

One of the principal objects of the invention is to provide a parachute flare which is certain in its operation and practically instantaneous and wherein the operation of launching the flare with its parachute is the operation which determines the subsequent ignition of the flare candle, it having been found that a mechanical operation is far more reliable than one which is automatic in its operation.

With the foregoing and other objects in mind, the invention provides an improved parachute flare embodying a novel arrangement for firing or igniting the flare candle as the parachute therefor opens; a novel means for withdrawing or unpacking the parachute as the flare is dropped; and a novel form of flare candle and ignition means for absolutely insuring ignition of the candle at the moment the flare is launched.

The purpose and advantages of the invention will be brought out in the course of the following detailed description, in which reference is made to the accompanying drawings, in which:

Fig. 1 is a part section and part elevation of the flare and

Fig. 2 is a view showing the flare mounted on a plane preparatory to being dropped.

The flare candle 10, which is usually of a magnesium compound, burns with a bright light and at a rather high temperature. It is ordinarily provided with a cardboard or paper covering 11 and in the present invention is encased in a metal container 12, of tubular form. The container 12 has a pair of bands provided with lugs 13 for supporting the flare as a unit on the under side of an air plane, to be released by the pilot in case of an emergency should it be necessary to make a forced landing or in any case when he has approached the field where he desires to land. The flare candle when ignited gives a very brilliant light and illuminates the ground beneath for a considerable distance and enables safe landing. Flares of this type are also used in warfare on bombing expeditions, when the flare serves in a particularly efficient manner to enable objects on the ground to

be distinguished from planes flying at relatively high altitudes. The dazzling light afforded by the flare candles in such cases is of a decided advantage further in that the enemy territory is flooded with light and the bombing planes are above the source of light and are therefore not distinguishable from the ground.

The casing 12 extends beyond the rearward end of the flare candle 10 and affords a hollow receptacle for a parachute 14 of any suitable or preferred form. The parachute 14 is packed after folding longitudinally and is laid zigzag the depth of the recess provided therefor, with the shroud lines 15 innermost. The parachute is arranged to be withdrawn from the casing by a pilot cord 16 attached to a convenient part of the airplane. The cord 16 extends through the peak of the parachute and for a considerable length lies inside the zigzag folds of the packed parachute so that it serves to withdraw the parachute from its casing, without having a positive or rupturable connection therewith. The cord 16 is knotted as at 17 where it enters the peak of the parachute inside the end of the casing 12. A friction cap 18 removably held on the opposite end of the casing 12 has a vent 19 through which the cord 16 extends. When the flare is dropped the lugs 13 are released from the conventional shackles and the flare dropped, candle end first, due to the cord 16 which delays the parachute end. The cord 16 becomes taut and the knot 17 insures the removal of the cap, followed by the withdrawing of the parachute. The candle proper is held from endwise movement inside the casing 12 by a crimped portion 12' in the casing wall adjacent the inner end of the candle. This crimping is done suitably at the time the candle is assembled in the casing.

The parachute shroud lines 15 are all connected with a concentration ring 20 having an eyelet 21 to which is attached one end of a metallic cable 22, connected with the rearward end of the candle 10 on an eyelet 23 riveted or otherwise held in the metallic end plate 24 of the candle. The cable 22 is wound into a roll and set in the depressed bottom of the candle 10 and is of a length sufficient when extended to reach out beyond the outer end of the casing 12 when the parachute 14 is withdrawn and opens. A heavy cardboard or felt washer 25 segregates the metallic

cable 22 from the linen shroud lines of the parachute to insure against chafing of the latter. As a further precaution against possible injury to the parachute shrouds, the outer end of the casing 12 is preferably spun over as shown at 26 to present round smooth edges. The cable 22 being of metal, further insures against the candle falling free of the parachute due to chafing with the metal casing when the flare is floating in mid air.

The flare candle is normally held "safe" from ignition when mounted on the plane or when in storage. It is armed and fired only when launched from the plane. A firing pin 27, normally tending to move inwardly under the action of a coiled compression spring 28 to strike a fulminate cap 29 is held safe when in storage by a cotter pin 30 passing through the end of the pin 27 and through a guard 31 extending over the projecting end of the pin. The guard 31 serves to prevent shearing of the cotter pin 30 in case the flare is dropped or accidentally comes into engagement with something while in storage or in transit. These latter details are well known and in general use and need no further description. When the flare is mounted in its rack on the plane, an arming wire or rip cord 32 is entered through a second opening in the pin 27 and the latter preferably bent over slightly to insure that the wire will remain in place until the flare is dropped. The cotter or safety pin 30 and the guard 31 are removed after the insertion of the wire 32. The wire 32 is conveniently threaded through a tube 33 extending lengthwise along the outside of the casing 12 and sweated or otherwise held thereon. The wire 32 extends into the casing 12 behind the candle 10 and is attached with the cable 22 to the eyelet 21 of the parachute 14. With this arrangement, as the parachute is withdrawn from the casing in the launching of the flare and commences to assume the support of the weight of the flare, due to the air entering the folds of the parachute, the end of the wire 32 is withdrawn from its position holding the firing pin 27 so that the latter is released and strikes the fulminate cap 29. This ignites a booster charge 34 inside a removable cap 35 on the front end of the casing 12. The booster charge 34 is normally held in a cartridge 36 behind a rupturable cap 37 and upon the firing of the cap 29 throws a sheet of flame over the entire end of the flare candle 10. The ignition occurs with explosive violence and forces the cap 35 of the end of the casing 12. The sheet of flame is sufficient to ignite charges of highly inflammable material 38 extending in veins inwardly in the end of the flare candle 10 in holes 39 drilled to an appreciable depth in the end of the candle. It has been found that with such a provision it is not necessary to alter the composition of the flare candle toward the igniting end and that

a candle of uniform composition throughout constructed in this manner will ignite almost instantly and a bright light will be afforded the moment of the ignition. The intense heat of the ignited highly inflammable substance insures the ignition of the less inflammable magnesium compound of which the candle itself is made inasmuch as each of the veins of highly inflammable substance extends inwardly to an appreciable depth in the end of the flare candle. When it is realized that oftentimes the aviator is placed in an emergency he must locate a suitable landing field while he is gliding with a dead engine, for example, a flare candle which throws a bright light the moment it is launched is highly desirable and a matter of a few seconds under such circumstances is of considerable consequence.

From the foregoing description, it will appear that I have provided a parachute flare which is absolutely positive in its operation and does not rely upon a sequence of automatic operations which may fail to go to completion due to some irregularity, but operates mechanically from the moment it is launched. The ignition of the flare candle is insured through a novel construction of the candle itself and further through a novel arrangement for igniting the candle in proper relation to the opening of the parachute which sustains the candle in mid-air. In operation, it has been found that the firing of the ignition charge with the resultant forward impulse to the candle occurs at approximately the instant the parachute is opening which is ideal from the standpoint that the flare is ignited at approximately the time the parachute is fully opened and the flare is sustained against rapid descent. The provision for opening the parachute is advantageous in that it operates without fail and without danger of injury to the parachute and without in any way hampering the opening thereof. The flare being ignited and sustained at hardly an appreciable instant after it is launched at a sufficiently high altitude illuminates a considerable area on the ground and the candle is given an opportunity to be consumed almost entirely, if not entirely, by the time it reaches the ground with the parachute. The intense heat at which the candle burns is sufficient to burn the metal container and affords a rising current of air to partially offset the weight tending to cause descent.

I claim:—

1. A parachute flare for droppage from aircraft comprising a candle, a casing about the same extending beyond the ends thereof, a firing charge and firing means held in normally safe condition in one end of said casing, a parachute packed in the opposite end of said casing connected with said candle, a tube extending from the end of said casing to the parachute end, and an arming wire extend-

ing through said tube fastened to the parachute and releasably holding said firing means safe to release the same when the flare is dropped.

5 2. A parachute flare for droppage from aircraft, comprising a candle, a casing about the same extending beyond the ends thereof, a firing charge and firing means held in normal safe condition in one end of said casing, a
10 parachute packed in the opposite end of said casing connected with said candle having a means connected with the craft releasably connected with said parachute to withdraw the same from said casing in the dropping of the
15 flare, and an arming wire connected to said parachute and detachably engaging said firing means for releasably holding said firing means safe to release the same when the flare is dropped.

20 3. A parachute flare for droppage from aircraft, comprising a candle, a casing about the same extending beyond the rear end thereof, a firing charge, a fulminate cap to set off the same, a self-acting spring pressed firing pin held in safe condition with respect to said
25 cap, a parachute packed in the casing behind the candle, and connected therewith, and an operating means extending between the opposite ends of said candle having connection
30 with said parachute at one end and releasably holding said firing pin safe at the other end to release the same upon the withdrawal of said parachute from said casing in the dropping of the flare.

35 4. A parachute flare for droppage from aircraft, comprising a candle, a casing about the same extending beyond the rear end thereof, a firing charge, a priming means to set off the same, a self-acting spring pressed firing pin held in safe condition with respect
40 to said priming means, a parachute packed in the casing behind said candle, and connected therewith, an operating means extending between the opposite ends of said candle
45 having connection with said parachute at one end and releasably holding said firing pin safe at the other end to release the same upon the withdrawal of said parachute from said casing in the dropping of the flare, and a cap
50 on said casing enclosing said firing pin, priming means, and charge adapted upon the ignition of said charge to be forced off the casing.

55 5. A parachute flare for droppage from aircraft, comprising a candle, a casing about the same extending beyond the end thereof to provide a parachute receptacle, a parachute therein, a pilot cord attached to the aircraft for withdrawing said parachute from said
60 casing, a cap on said casing to confine the parachute removable in the withdrawal of said parachute by said pilot cord, a firing charge for igniting the candle, a priming means to set off the same, a firing means for said priming
65 means, and an arming wire normally holding

said firing means safe having connections to release the same when the flare is dropped.

6. A parachute flare for droppage from aircraft, comprising a candle, a casing about the same extending beyond the end thereof to provide a parachute receptacle, a parachute
70 therein, a pilot cord attached to the aircraft for withdrawing said parachute from said casing, a cap on said casing to confine the parachute removable in the withdrawal of
75 said parachute by said pilot cord, a firing charge for igniting the candle, a priming means to set off the same, a firing means for said priming means, an arming wire normally holding the same safe having connections to
80 release the pin when the flare is dropped, and a cap on said casing enclosing said firing charge, priming means, and firing means adapted to be forced off in the ignition of said
85 charge.

7. A parachute flare for droppage from aircraft, comprising a candle, a casing about the same extending beyond the rear end thereof, ignition means for the candle at the forward end held safe during the carrying of
90 the flare and fired when the flare is dropped, a parachute in said casing behind said candle and connected therewith, a pilot cord attached to the aircraft having a connection with said parachute only sufficient to withdraw the same from said casing when the flare
95 is dropped, a knot on said cord, and a cap on said casing confining said parachute therein adapted to be removed by the engagement with the knot on said cord as the latter withdraws the parachute from said casing when
100 the flare is dropped.

8. A parachute flare for droppage from aircraft, comprising a flare candle, ignition means therefor normally held safe when the
105 flare is carried on the craft to be fired when the flare is dropped, a casing extending rearwardly from said candle, a parachute packed therein, and a pilot cord secured to the aircraft entered through an opening in the peak
110 of the parachute and packed for a portion of its length with the latter.

9. A parachute flare for droppage from aircraft comprising a flare candle, ignition means therefor normally held safe when the
115 flare is carried on the craft to be fired when the flare is dropped, a casing extending rearwardly from said candle, a parachute connected with said candle folded longitudinally and packed zigzag in said casing, and a pilot
120 cord placed between the folds of said parachute and having connection with the aircraft.

10. In a parachute flare, the combination of a flare candle, a parachute connected to the
125 rear end thereof, self-acting igniting means for the front end thereof, means to release said flare with the ignitable end down and with the parachute trailing, and a connection between said ignition means and said para-
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chute for operating said ignition means when said parachute commences to sustain the candle, the connection comprising a pull wire extending from the parachute to the ignition means of said candle of a length to be pulled to release said ignition means for automatic operation as the shrouds of the parachute become extended and taut.

11. A parachute flare for droppage from aircraft comprising a flare candle, ignition means therefor normally held safe when the flare is carried on the craft to be fired when the flare is dropped, a casing extending rearwardly from said candle, a parachute connected with said candle folded longitudinally and packed zigzag in said casing, a pilot cord placed between the folds of said parachute having connection with the aircraft, a cap on said casing to confine the parachute therein, having said cord entering through an opening therein, and a knot on said cord for removing said cap in the withdrawal of the parachute from the casing.

12. A parachute flare for droppage from aircraft, comprising a flare candle, ignition means at the forward end of said candle normally held safe in the carrying of the flare on the craft to be fired when the flare is dropped, a parachute container attached thereto extending from the rear end of said candle, a cable connected to said candle of a length sufficient to extend out beyond the end of said container, a relatively short pull wire detachably holding said ignition means safe, and a parachute having its shrouds connected

to said cable and said wire and packed in said container.

13. A parachute flare for droppage from aircraft, comprising a flare candle, ignition means at the end of said candle normally held safe in the carrying of the flare on the craft to be fired when the flare is dropped, a parachute container extending from the rear end of said candle, a cable connected to said candle of a length sufficient to extend out beyond the end of said container, a parachute having its shrouds connected to said cable packed in said container, a pilot cord extending out from the open end of said container connected with said aircraft for withdrawing said parachute from the casing when the flare is dropped, and a cap on said casing for confining the parachute therein removed in the withdrawal of said parachute by said cord.

14. A parachute flare for droppage from aircraft comprising a flare candle, ignition means at the forward end of said candle normally held safe in the carrying of the flare on the craft to be fired when the flare is dropped, a metallic parachute container extending from the rear end of said candle, a metallic cable connected to said candle of a length sufficient to extend out beyond the end of said container, a metallic arming wire extending from said ignition means rearwardly to said cable, and a parachute having its shrouds connected with said cable and wire packed in said container.

In testimony whereof I affix my signature.
GUY M. BALL.