Nov. 18, 1930. L. L. DRIGGS, JR., ET AL 1,782,291

PROJECTILE FOR SIGNALING OR ILLUMINATING PURPOSES

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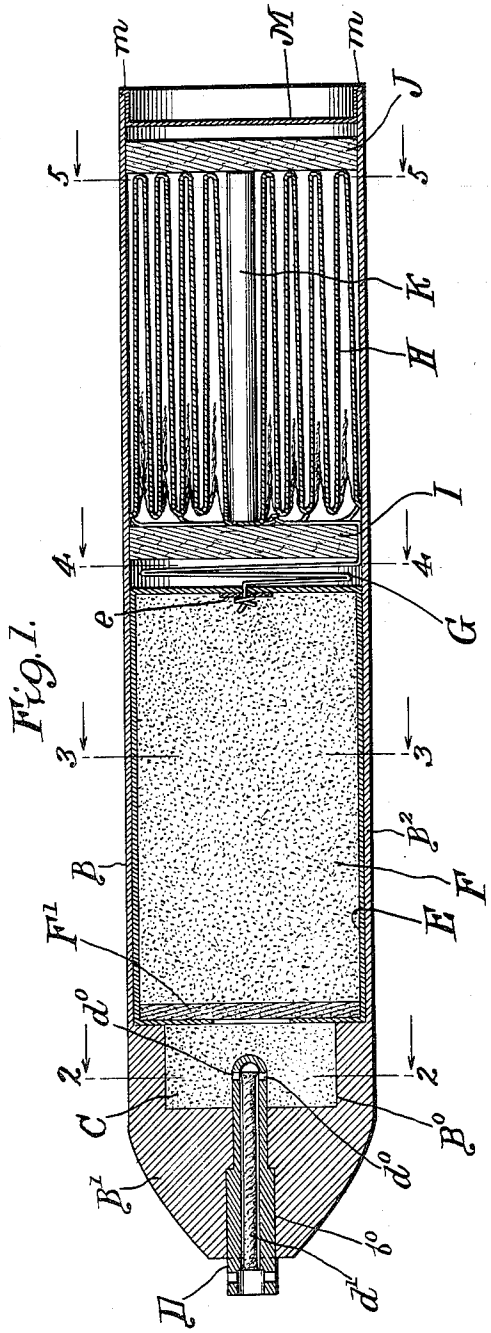

Fig. 1.

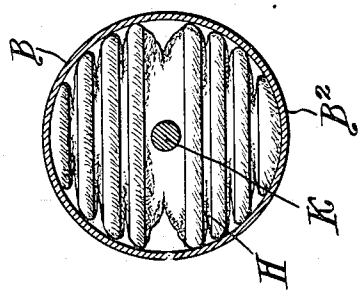

Fig. 5.

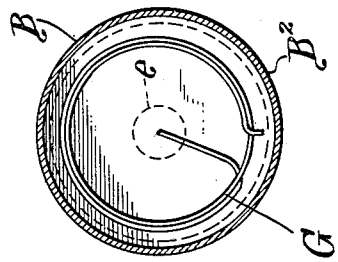

Fig. 4.

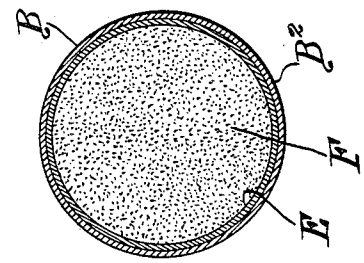

Fig. 3.

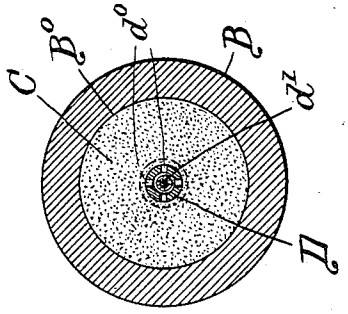

Fig. 2.

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Fig. 6.

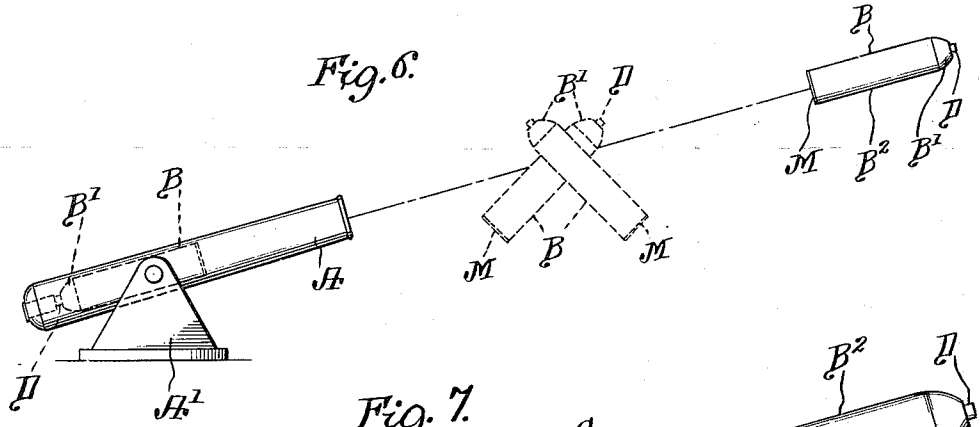


Fig. 7.

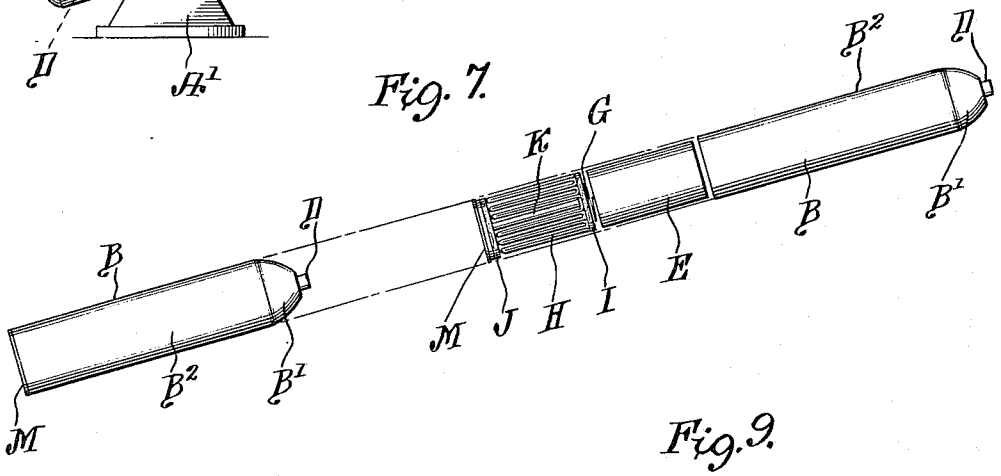


Fig. 9.

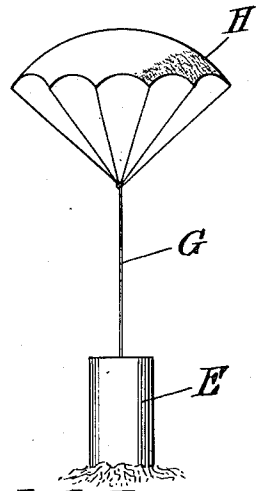
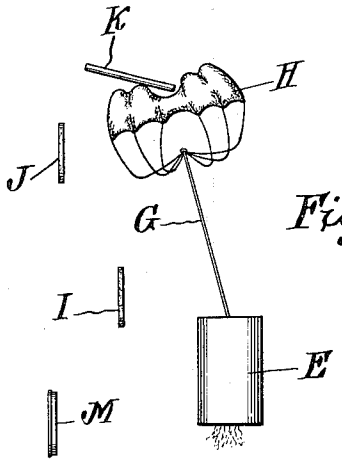


Fig. 8.



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UNITED STATES PATENT OFFICE

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PROJECTILE FOR SIGNALING OR ILLUMINATING PURPOSES

Application filed November 12, 1929. Serial No. 406,670.

Our present invention relates to projectiles for use in signaling or illuminating, and it is intended to cover an improvement on the projectile shown in our Patent No. 1,712,383, granted May 7, 1929, and entitled Fixed ammunition for firearm. In that patent, the projectile was intended to cover a short range only as a unit before a secondary explosion caused the signaling parts, such as the flare and parachute, to be ejected from the container forming the outer shell of the projectile; the idea in that case being mainly to have the projectile thrown a sufficient height up in the air for the purposes desired, or to have it propelled sufficiently clear of the aircraft, from which it might be launched before the secondary explosion referred to took place.

In the case referred to, the projectile and its container might be and preferably were of light construction only sufficiently rigid and strong to stand the limited strains involved, but according to our present invention, the projectile is intended to traverse a considerable range before the secondary explosion occurs, resulting in the disintegration of the projectile and the operation of the signaling devices.

Our invention will be more fully understood after reference to the accompanying drawings, in which like parts are indicated by similar reference symbols throughout the several views, and in which

Figure 1 shows a central longitudinal section through the projectile, ready for loading into the gun.

Figures 2, 3, 4 and 5 show sections along the lines 2—2, 3—3, 4—4 and 5—5 preferably of Figure 1, and looking in the direction of the arrows.

Figure 6 is a diagram, illustrating the flight of a projectile after leaving the piece, from which it is fired.

Figure 7 is a diagram showing the parts of the projectile after the secondary explosion has taken place.

Figure 8 shows the parts ejected from the main body of the projectile before the parachute has become distended, and

Figure 9 shows the parachute distended and supporting the flare as it descends gently.

A, shown only in Figure 6, indicates any suitable gun, preferably a smooth bore, mounted on any suitable support, such as A′, The details of the gun and its mount, not being a part of our present invention, will not be further described. B represents the outer shell of the projectile, having its closed end B′ ogival in form and of heavy weight, as shown in Figure 1. This end of the shell is provided with a chamber B° for the ejecting charge of powder C. In front of this chamber, the wall of the shell is reduced in thickness, as at B^2, so as to provide an enlarged loading chamber, in which the flare and parachute are mounted, as will be hereinafter described.

The shell B^2 should be preferably as thick only as is compatible with the necessary strength and rigidity required of the projectile when expelled from the gun. The shell B^2 may be integral with or secured to the base B′, as found most convenient; but we have shown the two as an integral structure, which may be made either of cast iron, or steel, or other suitable metal. The ogival B′ is perforated, as at $b°$, to receive the time fuse D. This fuse contains a time train d', which is ignited when the projectile is fired from the gun; and after the time interval has followed, the flame from this train will pass through the holes $d°$ in the end of the fuse stock, and will ignite the expelling charge C, thus ejecting the contents of the loading chamber, as will be hereinafter described.

Mounted in the rear end of the loading chamber is the flare casing E containing the illuminating composition F and the priming powder F′. The front end of the flare casing may be reinforced in any convenient way, as at e, to engage the cord G connecting the flare casing with the parachute H.

The parachute is folded in the forward portion of the loading chamber between the wads I and J, and surrounds the spacing rod K, which rod may be made of wood or hollow metal tubing, as desired, but the purpose of the rod or tube is to prevent the crushing

in of the parachute when the projectile is fired from the gun.

The forward end of the shell B^2 is closed by a suitable cap M, which should be sufficiently firmly secured in placed as by flanging over, as at *m*, so as to stand the pressure of the air when the projectile is discharged from the gun.

The projectile is loaded into the gun with the ogival head projecting into the powder chamber in the gun, and when the gun is fired, the projectile will fly as a unit outwards, with the lighter end forwards; the pressure of the air acting on this lighter end will cause the projectile to tumble or swing about its center of gravity, until the weighted head will assume the forward position indicated at the right of Figure 6, and the lighter rear portion of the shell will tend to keep it substantially pointed in the right direction, the whole projectile travelling like an arrow through the air.

When the time fuse has burned the predetermined interval, it will explode the ejecting charge C, and the secondary explosion will tend to accelerate the forward movement of the shell B^2 and head B', as shown in Figure 7; but, at the same time, a rearward movement will be imparted to the flare casing E and the parachute H. The secondary explosion will ignite the flare.

As soon as the parts assume the position shown in Figure 7, the weight of the flare will tend to cause it to fall more rapidly than the lighter parachute, and the wads I and J and rod or tube K and cap M will separate from the parachute, and these parts will then assume the position shown in Figure 8.

The range of the projectile would, of course, depend upon the velocity from which it was ejected from the gun; and the strength of the parts must necessarily be such as to withstand the shock of discharge from the gun.

After the secondary explosion takes place, it is immaterial whether or not the body portion or the shell of the projectile remains intact or not; but it is desirable to use an ejecting charge which will be sufficient to materially lessen the velocity of the flare and parachute when ejected, so that there may be no excessive strain on the parachute when the flare begins to fall. With the construction shown, it is planned to use a small projectile fired from a gun of 40 m. m. or approximately one and one-half inches, and to throw the projectile a mile or more; but obviously, heavier projectiles of greater initial velocities and having longer ranges might be used, if desired.

It will be seen that the projectile having a heavy base and a light outer casing, is in effect somewhat similar to an arrow, and this takes the place of the rotation caused by rifling in a rifled gun.

It is impossible within the confines of the space provided by ordinary one-pounder type of shells to produce a parachute signal or flare projectile.

It is necessary therefore to go to a projectile of greater length, and this at once eliminates the possibility of using rifling to stabilize the projectile in its flight, for the reason that the shells get so long that very erratic results would be obtained.

Furthermore, by having the flare and parachute ejected in a rearward direction after the second explosion, the forward velocity of the two will be checked, and the strain on the parachute will be minimized.

This invention is especially intended for use for navigating purposes, where it is desired to illuminate for some distance ahead the path of a moving ship, for instance, in ice fields or near icebergs, or other places where the navigation is difficult. It will be seen that by firing the projectile through the desired range and adjusting the time fuse so that the secondary explosion will take place at the proper time, the proposed path of a ship may be clearly illuminated for an appreciable time; and by firing a number of these shells, one after the other, such illumination may be repeated or prolonged, as may be desired.

It will be obvious that various changes might be made in the construction, combination and arrangement of parts, which could be used without departing from the spirit of our invention, and we do not mean to limit the invention to such details except as particularly pointed out in the claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent of the United States is:—

1. A projectile, comprising a hollow substantially cylindrical shell having its rear end closed by a heavy base, and its forward end closed by a separate cap, said base being provided with a chamber for the ejecting charge and an ejecting charge mounted in said chamber, and with a time fuse for igniting said charge, after a predetermined time interval, with a flare casing mounted in said shell in front of said chamber, and a parachute in front of said flare casing and connected thereto, whereby the center of gravity of said shell is brought near said base, causing said shell to turn end for end at the beginning of its flight and continue thereafter substantially base foremost.

2. A projectile comprising a hollow substantially cylindrical shell having its rear end closed by a heavy ogival shaped base, and its forward end closed by a separate cap, said base being provided with a chamber for the ejecting charge and an ejecting charge mounted in said chamber, and with a time fuse for igniting said charge, after a predetermined time interval, with a flare cas-

ing mounted in said shell in front of said chamber, and a parachute in front of said flare casing and connected thereto, whereby the center of gravity of said shell is brought near said base, causing said shell to turn end for end at the start of its flight and to continue thereafter substantially base foremost.

3. An elongated projectile comprising a hollow substantially cylindrical shell having its rear end closed by a heavy ogival shaped base, and its forward end closed by a separate hollow cup shaped cap, said base being provided with a chamber for the ejecting charge and an ejecting charge mounted in said chamber, and with a time fuse for igniting said charge, after a predetermined time interval, with a flare casing mounted in said shell in front of said chamber, and a parachute in front of said flare casing and connected thereto, whereby the center of gravity of said shell is brought near said base, causing said shell to turn end for end at the start of its flight and continue thereafter substantially base foremost.

4. An elongated projectile comprising a hollow substantially cylindrical shell having its rear end closed by a heavy tapered base, and its forward end closed by a separate cap, said base being provided with a chamber for the ejecting charge and an ejecting charge mounted in said chamber, and with a time fuse for igniting said charge, after a predetermined time interval, with a flare casing mounted in said shell in front of said chamber, and a parachute in front of said flare casing and connected thereto, whereby the center of gravity of said shell is brought near said base, with wads separating said parachute from said flare casing and from said cap, respectively, with a stiffening rod or tube extending between said wads.

5. An elongated projectile comprising a hollow substantially cylindrical shell having its rear end closed by a heavy ogival shaped base, and its forward end closed by a separate cap, said base being provided with a chamber for the ejecting charge and an ejecting charge mounted in said chamber, with means for igniting said charge, after a predetermined time interval, with a flare casing mounted in said shell in front of said chamber, and a parachute in front of said flare casing and connected thereto.

6. An elongated projectile comprising a hollow substantially cylindrical shell having its rear end closed by a heavy tapered base, and its forward end closed by a separate cap, said base being provided with a chamber for the ejecting charge and an ejecting charge mounted in said chamber, with means for igniting said charge, after a predetermined time interval, with a flare casing mounted in said shell in front of said chamber, and a parachute in front of said flare casing and connected thereto, with wads separating said parachute from said flare casing and from said cap, respectively, with a stiffening rod or tube extending between said wads.

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