A. G. BERGMAN.

ILLUMINATING PROJECTILE.

APPLICATION FILED APR. 2, 1919.

1,305,188.

Patented May 27, 1919.

Fig. 1.

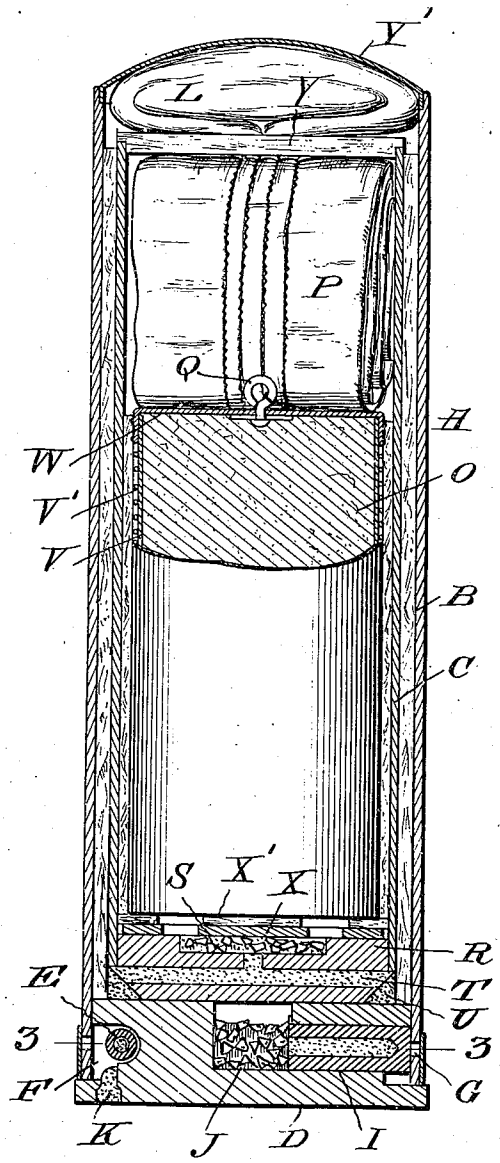


Fig. 2.

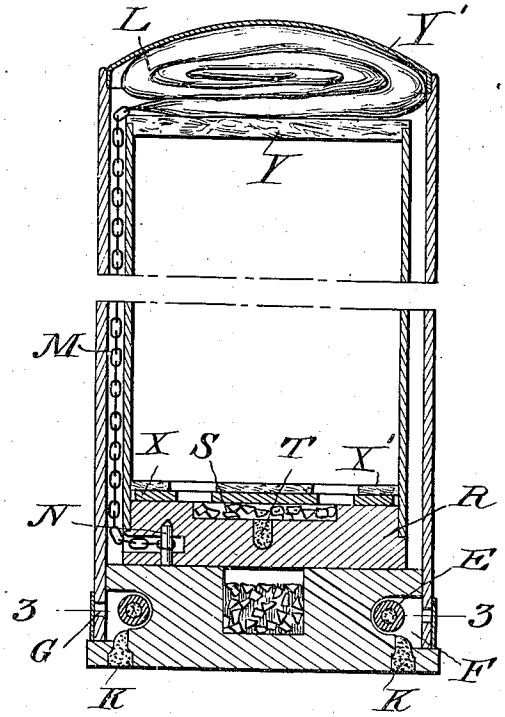
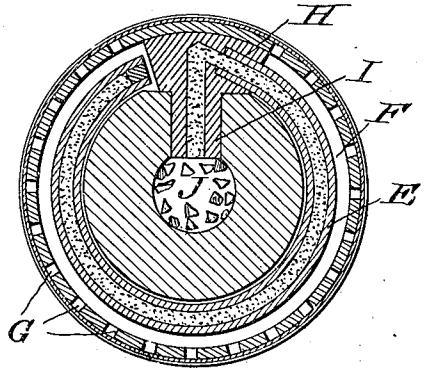


Fig. 3.



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ILLUMINATING-PROJECTILE.

1,305,188. Specification of Letters Patent. Patented May 27, 1919.

Original application filed February 17, 1917, Serial No. 149,260. Divided and this application filed April 2, 1919. Serial No. 287,002.

To all whom it may concern:

Be it known that I, AXEL G. BERGMAN, a subject of the King of Sweden, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Illuminating-Projectiles, of which the following is a specification.

This invention relates to illuminating projectiles and aims to provide certain improvements therein, the application being a division of original application filed February 17, 1917, Serial No. 149,260. Projectiles of this type are designed for illuminating an object or field in the distance and usually comprise a casing having a mass of illuminating material which is discharged from the casing at a definite point in the flight of the projectile, being at the same time ignited. The illuminating material is usually sustained in mid-air by a parachute or equivalent device which retards the fall thereof for a sufficient length of time to enable the illuminating material to expend itself. In my application No. 119,396, I have illustrated a construction of such shell.

The present invention relates to a construction of such devices which will better fit the shell for use in connection with higher powered guns than it has been hitherto possible to use effectively for such purposes. In the ordinary use of such projectiles it is found that if the speed of the projectile at the moment of expulsion of the illuminant and its parachute be in excess of a certain low rate, the parachute, whose real function it is to sustain the illuminant, is immediately slatted or torn to pieces with the result that the illuminant drops to the ground. Hence where the field of illumination is some distance away so that a gun of high power has to be used to obtain the distance, it is found impracticable to release the illuminant and its parachute except at or about the summit of the trajectory, at which point the shell is traveling at its lowest speed. This seriously interferes with the usefulness of the shell, as it practically prevents its use at shorter ranges.

The principal object of the present invention is to provide an illuminating shell from which the illuminant can be discharged at any point in the trajectory, practically irrespective of the speed of the projectile at the time of discharge. To this end the invention comprises a means for checking or stopping the illuminant in its forward flight in such manner as to avoid slatting of the sustaining parachute or other device. In the preferred form of the invention I make use of a retarding parachute which is so much smaller and so much stronger than the sustaining parachute that it can successfully resist the atmospheric pressure and check or retard the flight of the illuminant without danger of being destroyed. In carrying out the invention I may employ two casings, the inner of which contains the illuminant and its sustaining parachute, and the outer of which contains the inner casing and an attached retarding parachute. A timing element such as a time fuse is used in connection with the device, which effects the discharge of the inner casing at the appropriate point in the flight of the projectile, the outer casing continuing its flight and the inner casing being retarded at the proper point for the field to be illuminated. Preferably also the inner casing contains some timing element (which may be fixed) adapted to delay the expulsion charge for the illuminant until the speed of the inner casing is well checked, whereupon the illuminant and its sustaining parachute are projected and the illuminant ignited. The invention also includes certain other improvements which will be hereinafter more fully described.

Referring to the drawings which illustrate the preferred form of the invention,—

Figure 1 is a diametrical section of the complete projectile;

Fig. 2 is a similar view taken at an angle to Fig. 1;

Fig. 3 is a cross-section taken on the lines 3—3 in Figs 1 and 2.

Referring to the drawings, let A indicate the projectile as a whole which is shown as comprising an outer casing B and an inner casing C. The outer casing is preferably provided with a timing element such as a time fuse, the latter being shown as mounted in the base D and comprising a puncturable tube E arranged within a circular

chamber F. The lower end of the casing B is formed with a series of apertures G through which an instrument can be forced to penetrate the casing E. The casing E contains a powder or other charge having a definite rate of burning, and by puncturing the latter at the appropriate point, the length of time required to ignite the expelling charge is predetermined. Preferably the tube E is fitted in a block H which has an extension I leading to the chamber J which contains the expelling charge. Openings such as K permit the fire gases from the propelling charge to ignite the fuse through the punctured hole. This construction is in the main set forth in my prior application above alluded to.

The casing B also contains the retarding parachute L which is best packed above the casing C and is preferably attached to the latter casing by a chain M, the end of which is fastened to the casing C by a pin or the like N.

The casing C contains the illuminating body O, and above it the sustaining parachute P fastened to the body O by a cord connected with an eye Q, or in any other suitable manner. The casing C is preferably provided with a base R, the center part of which is formed with a chamber S adapted to contain an expelling charge for the illuminant. In the construction shown the base is also bored to receive a fuse such as T, the base at the ends of the bore being cut away as shown at U in order to permit the flames from the main expelling charge in the chamber J to easily reach the fuse. In the construction indicated the fuse T is adapted to burn about two seconds after the casing C is expelled, and before the expelling charge in the chamber S is ignited, this delay being desirable in order that time may be provided for the speed of the casing C to be checked or retarded before the illuminant body is expelled from the latter casing.

In illuminating shells, and particularly those for use in high power guns, the illuminant body is very apt to become shattered or crumbled by the force of the propelling charge in the gun. This force is communicated to the casing before the inertia of the shell can be transferred to the illuminant, and the latter becomes disintegrated or crushed. I find in practice, however, that if the illuminant be packed in a metallic or other stiff container which is adapted to burn or melt at about the same speed as the illuminant, the latter will be maintained intact, and this is particularly true if the container be wound with wire so as to strengthen the container. I have found in practice that sheet-zinc is quite appropriate for the container (which is shown at V). A common iron wire of light gage is suitable for winding it. The latter is indicated at V'. At the top of the container I prefer to employ a fiber disk W to which the eye Q is attached.

Between the bottom of the illuminant and the base I preferably employ a metal disk X which is suitably perforated to permit the gases from the chamber S to ignite the illuminant; and I also preferably impose between the disk X and the bottom of the illuminant a fiber disk X' which eases the shock on the illuminant when the projectile is fired.

Difficulty has also been encountered in the provision of a suitable cover for the casing C, which must be sufficiently easily forced out of place to permit the illuminant to leave the shell and which at the same time is capable of preventing ingress of fire gases to the illuminant while the latter is in the gun. I have found that a fiber disk such as Y forced into the end of the casing serves these purposes admirably. A similar construction is adopted in the end of the casing B as indicated at Y'.

In all prior illuminating shells with which I am acquainted, difficulty has been encountered in the unfolding of the parachute element in flight. Great care has been used in packing the parachute to avoid any twists or turns in the cords leading from the periphery of the parachute to the main or central cord, the latter device being folded or looped with the idea that by so doing the parachute would be enabled to become immediately expanded by the atmospheric pressure. The result has been, however, that frequent entanglement of the cords takes place so that a large percentage of the illuminants fall to the ground without the parachute filling. Efforts have been made to overcome this without success.

I have found, contrary to expectation, that if the numerous cords be well wound around and around the parachute body, the latter will fill quite as quickly, and practically all risk of entanglement of the cords is eliminated.

The operation of the invention will be apparent. If a gun has the possible range of three miles and it is desired to illuminate a field one-half mile distant, the time fuse is appropriately punctured to expel the inner casing just before the field is reached, whereupon the retarding parachute comes into effect and checks the inner casing for a determined period until its speed is overcome sufficiently to enable the sustaining parachute to act with safety, whereupon the illuminating charge and sustaining parachute are ejected and the charge ignited.

While the invention has been described with reference to a particular form of construction, it is not limited to the precise arrangement shown and described, inasmuch

as various changes can be made without departing from the spirit and scope of my invention.

What I claim is:—

1. An illuminating projectile having an outer casing, an inner casing, a retarding parachute fastened to said inner casing, an illuminant within said inner casing, and a sustaining parachute also within said inner casing, and connected to said illuminant.

2. An illuminating shell comprising an outer casing, a timing device carried by said outer casing, an inner casing, a retarding parachute connected to said inner casing, an expelling charge adapted to expel said inner casing and said parachute at a predetermined point in the trajectory of the shell, said inner casing carrying an illuminant, and a sustaining parachute, and means for expelling said illuminant and inner parachute after the inner casing is expelled from the outer casing.

3. A projectile having an illuminant contained therein and an automatically separable rigid wall positioned laterally of the illuminant and acting to protect the illuminant from excessive explosive shocks.

4. An illuminating shell comprising an outer casing, an inner casing, and an illuminant within the inner casing, an expelling charge for the inner casing, and an expelling charge for the illuminant.

5. An illuminating shell comprising an outer casing, an inner casing, and an illuminant within the inner casing, an expelling charge for the inner casing, an expelling charge for the illuminant, and a time fuse for said last-named expelling charge.

6. An illuminating shell comprising a casing, and a cover for said casing comprising a disk member contacting with a steel portion of the shell, said disk member formed of materially softer metal than steel.

7. An illuminating shell comprising a casing and a cover for said casing comprising a fiber member forced into the end of said casing.

8. An illuminating projectile containing an illuminant and sustaining means adapted to be discharged therefrom, an expelling charge, and separable means coöperating with said illuminant and sustaning means and acting to house the illuminant and sustaining means and also to receive the force of said expelling charge, whereby said contents can be discharged from the projectile without receiving a direct strain.

In witness whereof I have hereunto signed my name.

AXEL G. BERGMAN.