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ILLUMINATING SHELLS
Filed July 24, 1939

Serial No.
286,279
2 Sheets-Sheet 1

Fig. 1

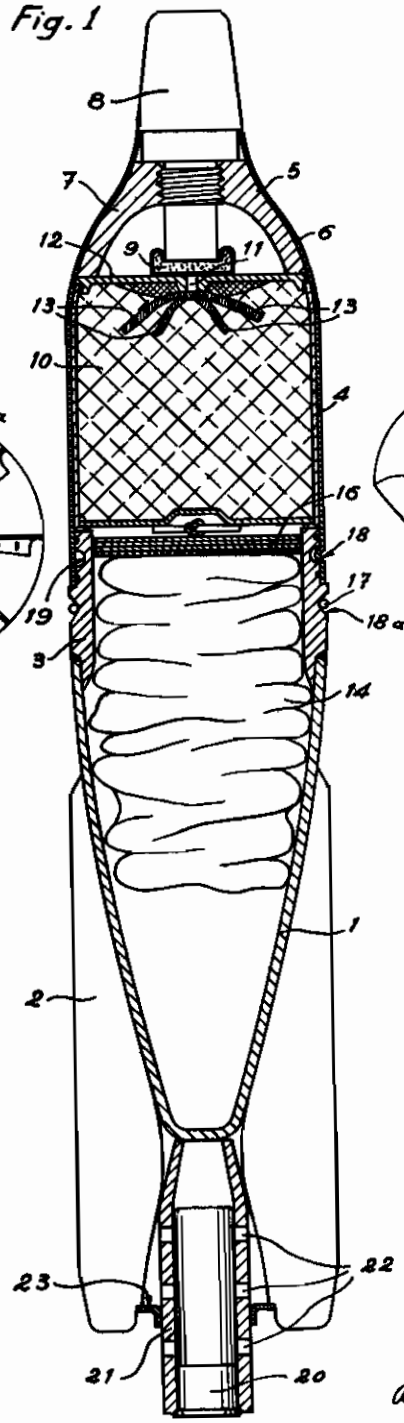

Fig. 2

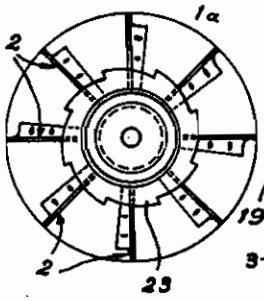

Fig. 3

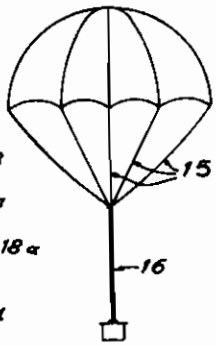

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Fig. 4

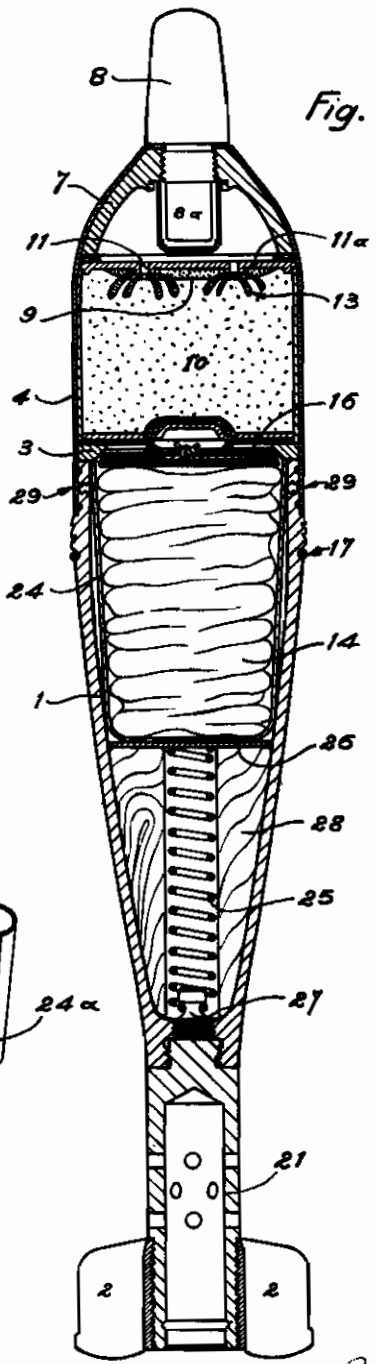
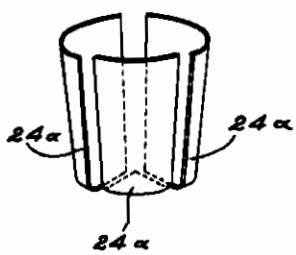


Fig. 5



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ALIEN PROPERTY CUSTODIAN

ILLUMINATING SHELLS

Jean Wauters, Bruxelles, Belgium; vested in the Alien Property Custodian

Application filed July 24, 1939

The usually illuminating shell generally comprises a cylindrical body within which are housed, from front to rear, the parachute, the flare slab and the ejecting charge.

When said shells are fired from smooth bore mortars, propulsion is often obtained by means of a cartridge introduced into a tubular rear stem provided with radial perforations permanently attached to the base of the shell. When the charge has been fired, the cartridge case, which has burst opposite the perforations in the stem, is powerfully pressed against the latter by the pressure of the gases and is drawn along by the shell thus leaving the barrel free for the next shot.

The objection raised against these devices is the insufficiency of their range due to their outline which is unfavourable to travel through the air. They whirl about themselves and, in practice, barely exceed a height of a few hundred yards.

The object of the present invention is to provide a projectile which, other things being equal, will travel distinctly higher or further.

It is particularly remarkable owing to the fact that it is provided with a vaned body the tapering nose and tail of which are connected by a cylindrical intermediate portion arranged so as to open under the action of the ejecting charge behind which the flare slab is housed, while the parachute is mounted at the rear of the latter and occupies a fraction of the tapering rear portion.

This arrangement provides a judicious distribution of the masses in the projectile and is conducive to its stability. As the parachute which is very light (it is usually made of silk) is placed at the rear of the projectile, the centre of gravity of the projectile is thereby set further forward.

According to a further feature of the invention, the body of the projectile is composed of a cone shaped base to the front of which is fixed a cylindrical collar which is itself capped by the rear portion of a cylindrical stamping the front end of which ends in a concavo-convex head the concave front end of which merges tangentially into the adjoining convex portion. This arrangement ensures the correct opening up of the projectile when it functions and the ready release of the flare and parachute which it contains.

A further feature of the invention lies in the fact that, at the rear, the slab rests on the front edge of said cylindrical collar. Said slab merely bears by inertia on said collar at the moment of firing and cannot therefore compress the parachute.

Other advantages and peculiarities of the invention will appear in the following description.

In the attached drawing which is given merely as an example,

Figure 1 is an axial section of an illuminating shell according to the invention;

Figure 2 is a view from the rear;

Figure 3 shows the flare slab suspended from the parachute;

Figure 4 is an axial section of another embodiment of the invention;

Figure 5 is a side view of the elements forming the parachute receiver.

In said drawing, 1 is the substantially conical base of the projectile to which stabilising vanes 2 are welded (by means of clamps 1*a*) or otherwise secured. To the base is fixed a cylindrical collar 3 capped by the rear portion of a stamping 4, which is cylindrical along a certain portion of its height, and which is terminated in front by a concavo-convex surface of revolution, the forward concave portion 5 merging with the adjoining convex portion 6 by a point of change of curve.

The concavo-convex portion of the stamping surrounds a hollow head, of corresponding outer shape, into which any type of time fuse may be screwed. Beneath fuse 8 is an explosive or ejecting charge 9 which itself tops flare slab 10 with which it communicates through a channel 11 drilled through container 12 of the slab. Matches 13 facilitate the ignition of the flare slab 10 attached to parachute 14 by suspending ropes 15 and a cable 16.

Parachute 14, suitably folded, is housed at least partially in the base 1, at the rear of slab 10 which rests on the front edge of collar 3.

A driving band 17, capable of distorsion and housed in groove 18*a* of collar 3, is intended to ensure leakproofness between the projectile and the smooth bore of the gun.

Stamping 4 is preferably secured to collar 3 by a few punch marks 18 hammered into said stamping in line with a groove 19 in the collar.

The flare slab 10 is retained against movement in the shell by being interposed between the under edge of the head 7 and the upper edge of the collar 3.

In the present example, propulsion is obtained by means of a cartridge 20 housed in tubular stem 21 radially perforated at points 22 and removably fitted to the rear of the projectile. The

tail stem is secured by the friction of its flange 23 on the inner edge of vanes 2 in the manner described in my co-pending Patent Application Serial No. filed on the same date as the present application and entitled: "Improvements in vaned projectiles."

Operation is as follows:

Cartridge 20 having been fired, the gases from the gunpowder escape through perforations 22 thus propelling the projectile. Tail stem 21 becomes detached and is expelled by the effect of the blast after the projectile has itself emerged from the tube, as explained in the afore-mentioned co-pending application. Driving band 17 is propelled by the gases between the projectile and the tube and ensures leak-proofness. Slab 10, which rests on collar 3, cannot compress the parachute owing to the effect of inertia developed on firing.

After a period of time determined by the setting of time fuse 3, the latter fires ejecting charge 8 which deflagrates in head 7 and ejects slab 10 from stamping 4, which becomes detached from collar 3. Parachute 14, drawn along by slab 10, emerges from its housing and opens out as shown in Fig. 3. Slab 10, ignited by matches 13, then burns and provides the desired illumination.

Instead of tail stem 21 being fitted loose, it might be permanently fixed to the projectile. Nevertheless, the detachable tail stem making the rear lighter improves the stability and therefore contributes to a greater range. The thickness of head 7 necessitated by the fact that it has to resist the pressure of the ejection charge also offers the advantage of bringing the center of gravity further forward.

In the embodiment of the invention shown in Fig. 4 where the same reference numbers relate to the same parts as on Fig. 1, the parachute 14 is lodged in a receiver or case 24 having the shape of a tumbler the sides of which widen slightly from rear to front. The receiver 24 is made up of a plurality of elements 24*a* (Fig. 5) which separates from each other when the shell opens under the action of the explosive charge or booster 8*a*.

A spring 25 bearing, at one end, against the internal bottom of the base 1, and, at the other end, against the bottom of the receiver 24, is used to expel the receiver and the parachute out of the shell when the same is burst by the explosive charge 8*a*. The spring 25 is centered along the axis of the shell by a block 28, which may be made of wood or some other relatively light material.

The spring 25 is positioned in an axial hole of the block 28 as shown in Fig. 4.

The black 28, preferably, corresponds in shape to the internal walls of the base 1 and is stuck or otherwise fixed thereto. It acts as a rearward bearing for the receiver 24.

The rear end of the spring 25 is attached to a teat 27 fixed in the bottom of the base 1.

In the embodiment of Fig. 4 the stem 21 carrying the propulsive cartridge is fixed to the shell, and the vanes 2 are fixed to the rear part of the stem, so that a space is left free in the front of the vanes to place the additional propulsive charges shaped by example as a horse shoe.

The forward part of the stamping 4 is entirely convex. That stamping is fixed, at the rear, to the ogival base of the shell with screws 29. The connection is calculated to yield under the pressure of the gases developed by the booster 8*a* when fired by the fuse 8.

It will be understood that the invention has been illustrated and described merely as an example and that it is capable of variation and modification without departing from the spirit of the invention.

JEAN WAUTERS.