Jan. 27, 1942. C. R. WEINERT 2,271,280

GAS PRODUCING PROJECTILE

Filed Dec. 11, 1935 2 Sheets-Sheet 1

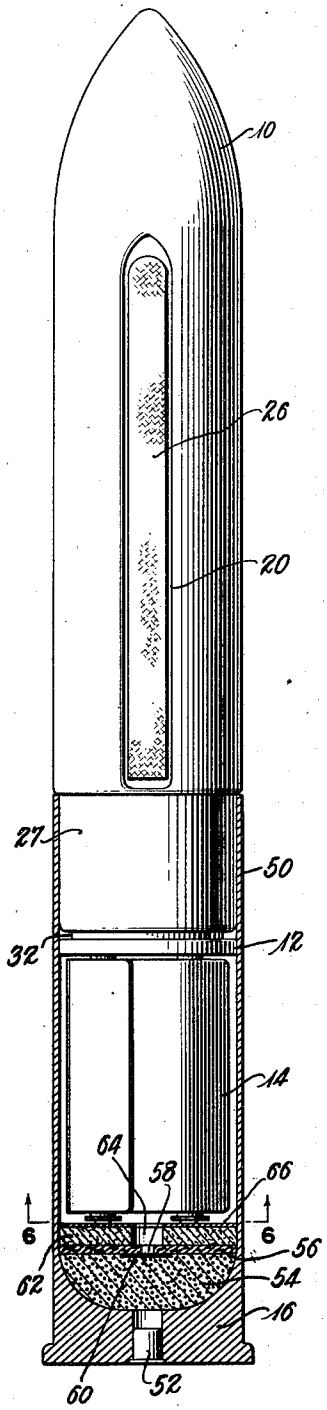


FIG. 1

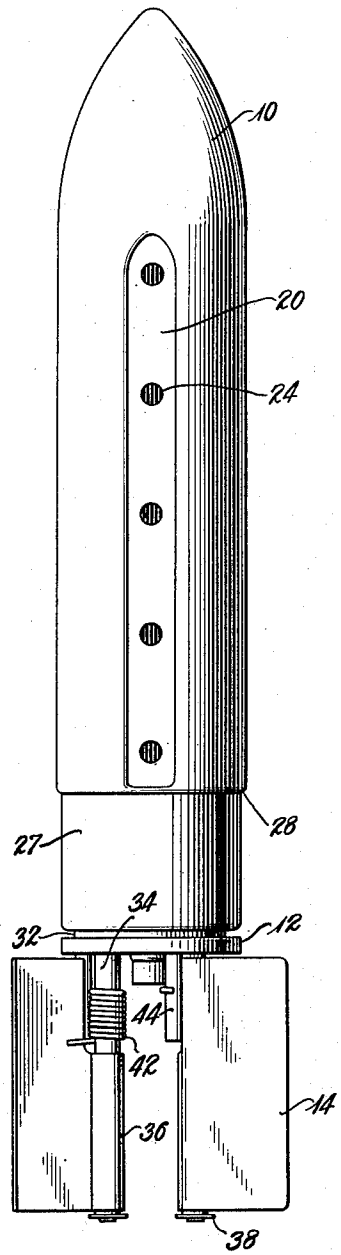


FIG. 2

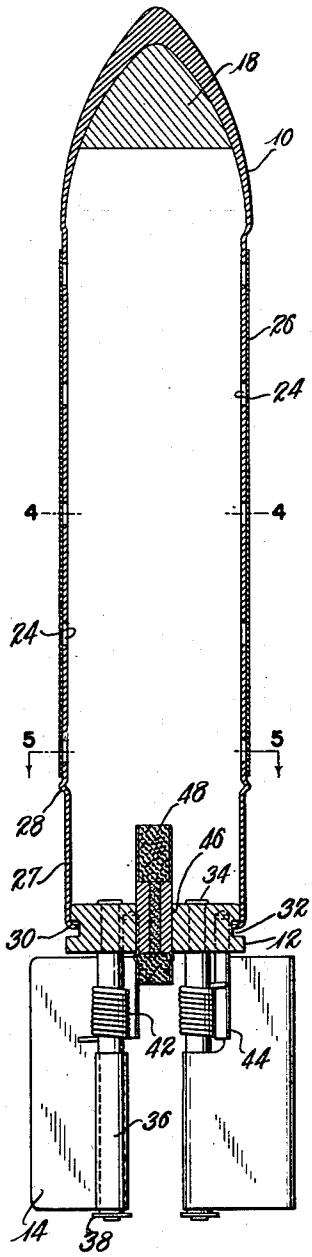


FIG. 3

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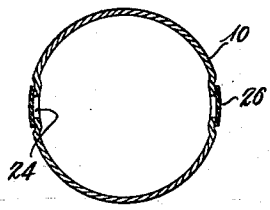


FIG. 4

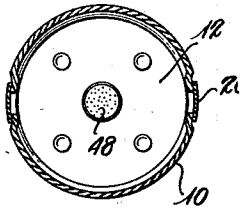


FIG. 5

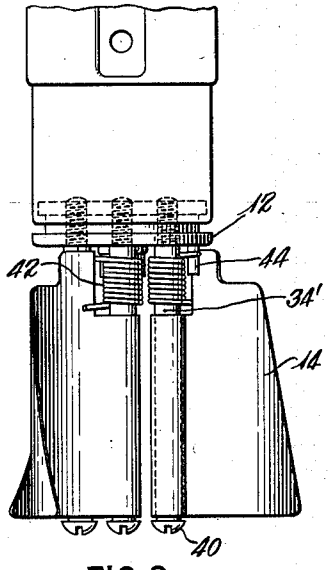


FIG. 8

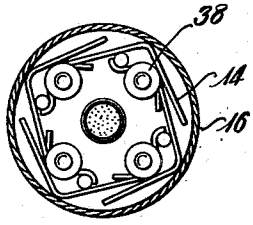


FIG. 6

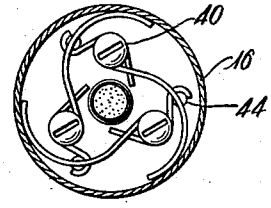


FIG. 9

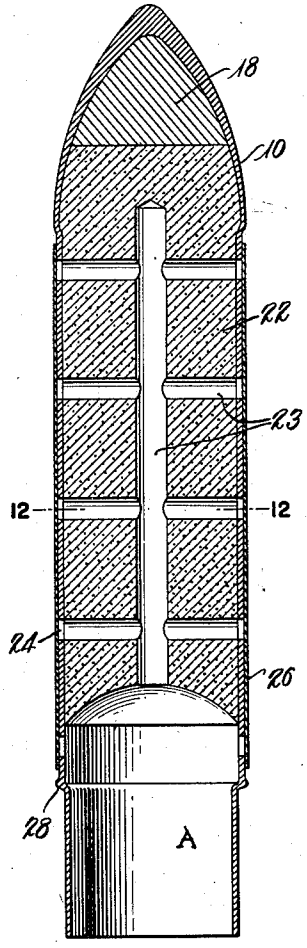


FIG. 11

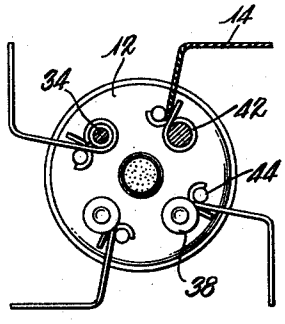


FIG. 7

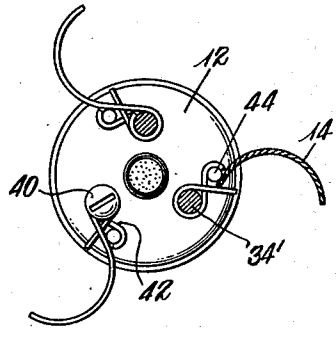


FIG. 10

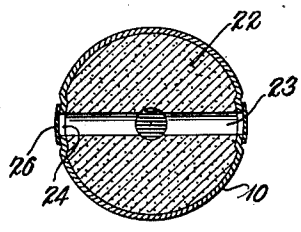


FIG. 12

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UNITED STATES PATENT OFFICE

2,271,280

GAS PRODUCING PROJECTILE

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Application December 11, 1935, Serial No. 53,988

6 Claims. (Cl. 102—24)

This invention relates to projectiles and more particularly to projectiles which are adapted to be used in dispersing mobs and breaking barricades.

The use of so-called "tear gas" bombs is well known, but heretofore the use of such bombs has been restricted to the dispersion of mobs among which police officers have been able to mingle and into which they have been able to drop a bomb or grenade adapted to expel repelling fumes and gases. The devices of this character now in use are not adapted to be propelled along a predetermined trajectory, and consequently their use in breaking barricades has been relatively limited. Furthermore, many of the devices now in use are of an explosive character which renders their use dangerous when no physical injury is intended.

It is therefore an object of the present invention to provide a repellant gas expelling projectile which may be propelled along a predetermined trajectory and which will accurately maintain its course of flight for a considerable distance. This object is accomplished by providing a projectile having at the rear thereof articulated fins or vanes which are adapted automatically to move into a wider radial zone than that described by the body of the projectile itself. The articulated stabilizing members are adapted to be held in retracted or inoperative position by a cartridge which contains a sufficient amount of propellant material to sustain the projectile in flight for a substantial distance. The projectile and its associated cartridge are adapted to be used with a comparatively light weight and compact riot gun in which the propellant cartridge is exploded and from which the projectile is discharged.

It is a further object of the invention to provide a repellant gas projectile which is non-explosive, and this object is accomplished by providing a plurality of gas discharge vents from which a gas being generated within the projectile may flow in profusion.

It is a further object of the invention to provide in a projectile of this type a time fuse which may be set to meet the requirement of varying conditions in combination with a unique arrangement of certain other parts of the device.

Additional important objects and advantages of the invention will be apparent in part and will be explained in part in the following specification read in connection with the drawings in which, by way of example only:

Fig. 1 is an elevational view of the projectile forming the subject matter of this invention, in which the cartridge is shown in longitudinal section.

Fig. 2 is an elevational view of the projectile as it appears in flight with its vanes extended into flight stabilizing position.

Fig. 3 is a longitudinal sectional view of the projectile shown in Fig. 2, and the same is taken upon a plane 90° about the plane of Fig. 2.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 1.

Fig. 7 is a rear view of one form of vanes in open position, with parts in fragmentary section.

Fig. 8 is a fragmentary view corresponding in general to Fig. 2, but shows modified form of vanes and vane mountings.

Fig. 9 is a view corresponding in general to Fig. 6, but shows the modified vane structure illustrated in Fig. 8.

Fig. 10 is a view corresponding in general to Fig. 7, but shows the modified vane structure illustrated in Fig. 8.

Fig. 11 is a central longitudinal sectional view of the loaded projectile casing, and illustrates the gas discharge channels through the charge within the projectile casing, and

Fig. 12 is a sectional view on line 12—12 of Fig. 11.

The projectile comprises a casing 10 fixed at its rear end to a fuse block 12 upon which are placed articulated vanes 14, and these three assembled principal elements are adapted to be received by a propellant containing cartridge 16.

The projectile casing 10 comprises a substantially cylindrical seamless casing, the nose of which is of ogival formation. Within the nose, the walls of which may be thicker than the body portion of the casing to resist shock, is a weight 18 so proportioned and located as to impart to the projectile the optimum ballistic balance. At two or more equally spaced points about the circumference of the projectile and extending longitudinally along its length are formed depressions 20, the purpose of which will hereinafter be more fully explained.

Pressed tightly into the projectile casing and terminating short of the rear end thereof to form a gas generating pressure chamber A is a body of gas forming chemical composition 22. This gas generating pressure chamber A is positioned intermediate of the gas producing compound 22

and the fuse block 32 respectively shown in Figs. 11 and 3. This composition, which forms no part of this invention, may be a lachrymatory, sternutatory or irritant such as chloracetophenone or diphenylaminechlorarsine, or a mixture of both, an igniting fuel such as smokeless powder, and a stabilizer such as magnesium oxide or calcium carbonate. The chemical composition 22 and the weight 18 are securely fixed in the projectile so that any tendency toward "set-back" is avoided when the projectile is discharged from a gun.

After the chemical composition has been tightly packed into the projectile casing 10, vent passages 23 may be formed both radially and axially through the chemical mass, the axial passage constituting an initial gas generating space or area. The radial passages 23 in the chemical mass are coincident and in alignment with vent passages 24 formed in the casing groove 20 and extend radially from the axially arranged gas generating space.

The vent passages 24 are sealed by means of a water proof sealing strip 26 which may be an adhesive tape, or other suitable material. The groove 20 is sufficiently depressed below the principal diameter of the projectile casing to receive completely therein the sealing strip 26 without any portion thereof extending beyond the principal diameter of the projectile casing. This relationship is maintained with care to guard against contact of the sealing strip 26 with the barrel of the gun during discharge of the projectile which might result in damage to the sealing strip and its possible premature removal during the discharging operation.

The rear or open end of the projectile casing 10 is offset inwardly at 27 to form a neck of reduced diameter adapted to fit snugly into the open end of the cartridge 16. The formation of the diametrically reduced neck 27 results in a shoulder 28 which serves as a stop to limit the movement of the projectile casing into the cartridge 16.

After the projectile casing has been loaded with a chemical compound, as above indicated, the open end is attached to the fuse block 12 in any convenient manner such as spinning the periphery 30 of the open edge of the casing into a groove 32 provided along the circumference of the fuse block 12.

In the most convenient method of assembly the vanes 14 are attached to the fuse block 12 before the fuse block is assembled with the projectile casing. In any event it has been found convenient to at least place vane spindles 34 in position before any assembly of the fuse block with the projectile casing is effected. Several methods of fixing the vane spindles 34 may be employed and two methods have been illustrated. In Fig. 3, the fuse block is provided with four equally spaced holes around the circumference thereof, and through these holes may be passed the reduced ends of spindles 34 which are securely fixed in position by upsetting the inwardly projecting reduced ends thereof. In Fig. 8 the spindles 34' are illustrated as threaded elements which may be threaded into holes provided in the fuse block.

The movable vanes at the rear end of the projectile are so constructed that, in their inoperative, or folded position they occupy an over-all diameter which is less than the diameter of the fuse block and projectile casing, and in their operative, or open position they describe a diameter greater than any diameter of the fuse block and projectile casing so as to extend into a zone at the end of the projectile casing where they can be of maximum advantage in stabilizing the flight of the projectile along its entire trajectory.

The vanes 14, of which several forms have been found satisfactory, are turned in upon themselves at their inner edge to form a bearing member 36 which is adapted to fit over the vane spindle 34, and the vanes are retained on the spindles by means of washers 38 on the one hand or the screw heads 40 on the other hand. Associated with each vane is an actuating spring 42 which is coiled about the vane spindle and one end of which is in contact with the vane while the other end is in contact with a stop pin 44. Consequently the vanes 14 are continuously urged into their operative or open position and assume a stable open position as soon as the projectile is released from its cartridge 16 and the gun barrel. The stop pins 44 limit the movement of the vanes and these pins are carefully positioned so that, in their open or operative position, the vanes maintain a stable balanced relationship to each other.

It has been found that the vanes may be made of different shapes and it has been found in practice that those forms illustrated in Figs. 2, 6 and 7 are most satisfactory. In this form of the invention, four equally spaced vanes are provided and the vane bodies are bent at an angle throughout their length which permits the same to fold compactly, but at the same time affords maximum stabilization during flight. A modified arrangement is illustrated in Figs. 8, 9 and 10, wherein have been shown a set of three vanes spaced about the circumference of the projectile, and in this form the vanes represent a diagonal segment of a cylinder.

It will be noted that a free axial zone is provided between the vane spindles both when the vanes are in inoperative and operative positions. Coaxially with this zone and extending directly through the fuse block is a fuse receiving aperture 46. The fuse aperture 46 is adapted to hold a time fuse of any well known construction satisfactory for the purpose. By virtue of the free axial zone between the vane spindles, the time fuse 48 will be readily ignited by the discharge of the propellant in the cartridge 16.

Turning now to the cartridge 16, it will be noted that the same consists of an open ended cylindrical body 50 of which the internal diameter fits in snug relation the reduced portion 27 of the projectile. In the base of the cartridge 16 is a detonation cap 52 which, upon explosion, is adapted to ignite a propellant 54 which may be any satisfactory material such as powder. Over the propellant is placed a wad 56 of satisfactory sheet material such as cardboard. The wad 56 is provided with an axial bore 58 which is sealed with a strip of cellulose tape 60 or with some other easily ignitable and rupturable material. Above the wad 56 is a felt wad 62 which is also formed with an axial bore 64, and over the wad 64 is placed a non-yielding sheet metal washer 66 which likewise has an axial bore concentric with the bore 64 in the wad 62. It is the function of the sheet metal washer 66 to impart the force generated by the propellant 54 equally to the vane spindles 34 which rest on this washer at equally spaced points about its surface.

The operation of the projectile hereinabove described is probably clear from the description which has been given, but by way of summary the complete operation will be described. When

the projectile casing 10 and the cartridge 16 are handled as a unit, it is simply necessary to remove the projectile from the cartridge in order to set the time fuse 48 to meet the requirement of a particular situation. The articulated vanes 14 are then folded inwardly against the tension of the springs 42 and the projectile casing is again placed into the shell 16 until the shoulder 28 comes in contact with the mouth of the shell. The projectile casing and cartridge are then placed in a gun of suitable caliber and upon the operation of the same, the firing pin strikes the percussion-cap 52 which in turn ignites the propellant material 54, the force of which moves the wad 62 and the metal plate 66 forwardly to impart propelling force to the projectile. At the same time the cellulose strip 60 is broken and flame from the propellant 54 passes forward through the axially free zone leading to the fuse 48 which is ignited as the projectile begins to move forward in the barrel of the gun.

As the projectile leaves the muzzle of the gun the springs 42 move the vanes 14 into their extended position where they lie in a zone most effective to stabilize the flight of the projectile. As the time fuse 48 ignites the gas producing compound within the projectile, the pressure therein begins to rise and fill the channels in the body of the compound under the discharge vents 24 lying beneath the tape 26. This pressure is effective to force the tape 26 off the channel 20 to expose the gas discharge vents 24. The number of vents provided and their spaced position around the projectile insure an adequate discharge of the generated gases and also insure the projectile against explosion. The heat being generated by the combustion of the fuel within the projectile, even before the gases therein reach a pressure sufficient to dislodge the seal 26, raises the temperature of the casing to such a point that convenient handling becomes impossible, thereby insuring the same against destruction by a barricaded person or persons.

The principles herein taught may be variously utilized. For example the stabilizing vane arrangement in its relation with a propellant containing cartridge may be applied to any projectile whether gas producing, explosive, or otherwise. Likewise the gas discharge vent arrangement is useful not only in a gas producing projectile adapted to be fired from a gun, but is equally as useful in a grenade type gas bomb which is adapted to be manually handled. Since, therefore, the embodiments herein described and illustrated are for the purpose of illustration only, and since it is obvious that various modifications and changes may be made without departing from the spirit of the invention, it is intended that the practice of the invention be not limited other than by limitations which may be imposed thereon by the scope of the subjoined claims.

What I claim is:

1. A gas producing bomb for firing from a smooth bore gun comprising a projectile, a fuse block at the base of said projectile, pivot posts secured upon the fuse block and extending rearwardly and longitudinally of the projectile, flight stabilizing vanes articulated on said pivot posts and movable thereabout, a propellent charge for said projectile, and means in direct contact with the rear ends of said pivot posts and separating the propellent charge and the stabilizing vane structure for unifying and distributing the force of the propellent charge over the projectile at the time the charge is fired.

2. A gas producing bomb for firing from a smooth bore gun comprising a projectile with expansible flight stabilizing vanes longitudinally pivoted on the base of the projectile and capable of contracting sufficiently to enter the casing of a cartridge forming part of said gas producing bomb and having a base flange for engaging the breech chamber of the gun to hold the bomb therein, a propellent charge for the projectile within the casing, and means in direct contact with the rear ends of the longitudinal pivots of said stabilizing vanes for separating said vanes from the propellent charge and for unifying and distributing the force of the propellent charge equally over the projectile when the charge is fired.

3. A non-explosive gas producing projectile adapted to be fired from a gun, said projectile comprising a casing, a closure member at the base thereof and a fuse in said closure member, said casing having discharge vents in the side walls thereof, sealing means over said vents adapted to be blown off by gas pressure, a gas producing charge within and fitting the forward portion of said casing, leaving a gas generating space between said charge and said closure member, said charge having a longitudinal passage therein and transverse passages extending between said longitudinal passage and each of said discharge vents.

4. A projectile according to claim 3, in which the discharge vents are located in a depressed area of the outer wall of the casing within the cylindrical contour thereof.

5. A projectile according to claim 3, in which the discharge vents are located in a depressed area which is formed by longitudinal grooves in the wall of said casing, the depth of the grooves being sufficient that vent sealing material lying therein is protected from abrasion by contact with the barrel of the gun from which the projectile is fired.

6. A projectile according to claim 3, in which the discharge vents are located in a depressed area which is formed by longitudinal grooves in the wall of said casing, and a strip of adhesive tape extending substantially the length of each of the grooves and over the vents forms the means for sealing the vents.

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