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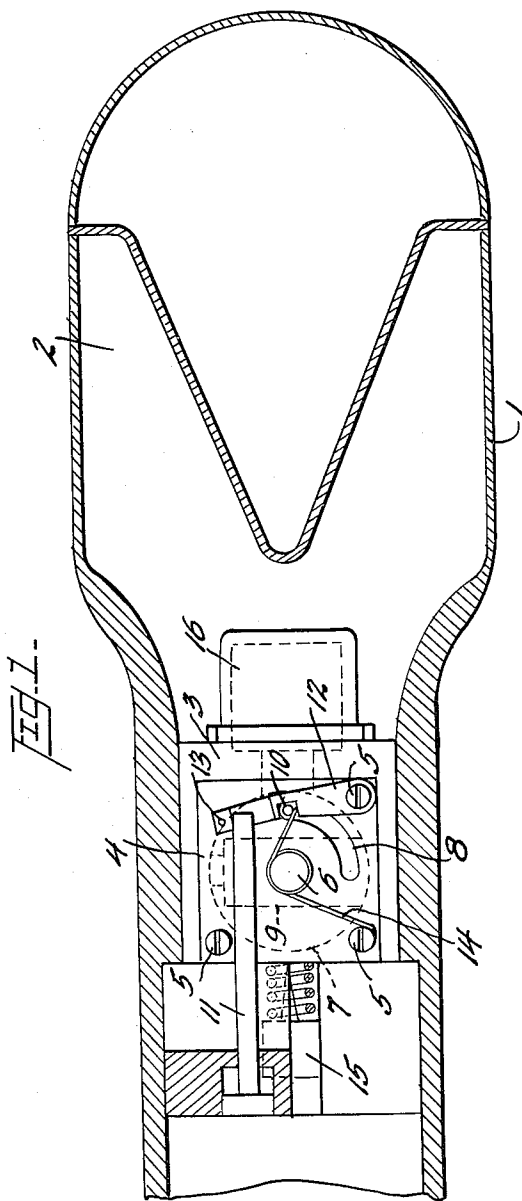
C. A. SOMVILLE

2,988,995

PROJECTILE FUZE

Filed Jan. 6, 1958

2 Sheets-Sheet 1



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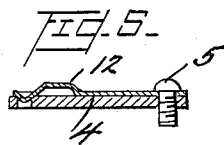
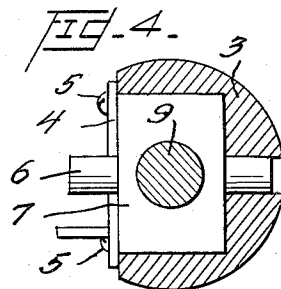
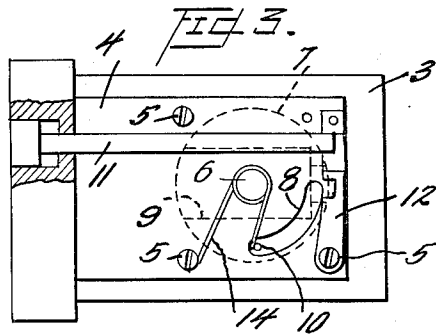
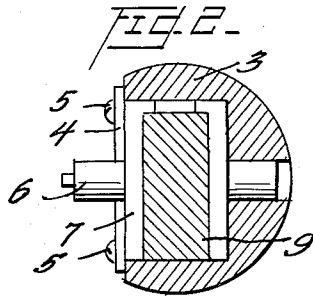
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PROJECTILE FUZE

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The present invention relates to fuzes for projectiles and is carried out by employment of a rotor type detonator holder. The invention has reference more particularly to fuzes which are mounted to the base of projectiles and take advantage from the propellant gases launching them. It is a primary object of the invention to provide a secure fuze for such projectiles, which, like rifle grenades or mortar shells, are stabilized on their trajectory by fins and which are of moderate velocity and acceleration.

The use of rotor type detonator holders for the arming of fuzes is well known in the art. Such rotors which are provided to maintain the detonator separated from the booster and the high explosive charge of the projectile, have, generally, spherical, cylindrical or ellipsoidal shapes. Upon launching of the projectile the rotor is actuated so that it rotates about its axis and moves the detonator in arming position. Fuzes of the kind found in the prior art usually involve a mechanism to make the rotor turn, such mechanism being actuated by means responsive to the rotation of the projectile or by linearly responsive rack and pinion gear trains. Still others propose to take advantage of the driving torque exerted on a rotor which has its center of mass distant from the axis of rotation. The aforescribed means, however, are precluded from being applied to numerous projectiles of small dimensions, moderate velocity and acceleration, and of the fin stabilized non-rotating type. Ammunition of the kind must, in addition, be rather cheap.

Typical projectiles of this kind showing all of the foregoing characteristic features are rifle grenades, though the invention, without departing from its spirit and scope, can be applied to all other ammunition categories, such as mortar shells, rockets, etc., be they actuated by nose or by base fuzes and no matter whether these fuzes represent a mechanic, electric or other mechanism.

Briefly the invention is carried out by the employment of a cylindrical rotating member, referred to hereinafter as a rotor, disposed within said rotor, in a plane parallel to its base, a tubular detonator to ignite the explosive charge, and a spiral spring, which, upon launching of the projectile, is released and turns the rotor about its axis. Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a side view partly in section of the warhead of a rifle grenade as example for one of the various possible applications of the invention, with the fuze in an unarmed or safe condition.

FIG. 2 is a cross section view of the fuze forming the subject matter of this invention in an unarmed position.

FIG. 3 is a side view of the fuze in an armed position.

FIG. 4 is a cross section of the fuze in an armed position.

FIG. 5 is a side view showing, as a detail of the invention, the notched lever and the cover plate of the fuze cage.

The cage 3 of the fuze forming the subject matter of this invention is secured by suitable means, such as by threaded engagement or by press fit, to the base of warhead 1 of a rifle grenade comprising a high explosive charge 2 of the Munroe type. While the outer faces of cage 3 conform to the adjacent receptacle formed in the

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base of warhead 1 and may be flat or convex, cover plate 4, secured to cage 3 by means of preferably three screws 5, is flat and centrally apertured for reception of one end of rotor shaft 6. The rotor, hidden in FIGS. 1 and 3 by cover plate 4, is represented there in dotted lines. An arcuate slot 8, equal in length, preferably, to a quarter of a circle, is cut in cover plate 4.

The base portion of rotor shaft 6 is received in a bore made in the base wall of cage 3. Rotor 7 is substantially formed in the shape of a cylinder but may be provided with camfers or recesses to which, in the case of an electric fuze, the contact plates can be secured. Disposed within a medium plane of rotor 7 and parallel to its bases, is detonator 9 of, generally, tubular or truncated shape. Pin 10 is secured to rotor 7 in such a manner as to protrude from arcuate slot 8 when the fuze is assembled.

Piston rod 11 extends into the fuze through a suitable bore in such a manner that it can be displaced in a plane parallel to cover plate 4 and pivot the notched lever 12. The fulcrum of lever 12 may coincide with one of screws 5. Disposed on the end of lever 12 is a nose which is engaged in hole 13 made in cover plate 4.

By this arrangement the lever is locked which becomes immediately apparent from FIG. 5. Spiral spring 14 encircles the rotor shaft portion protruding from the central aperture in cover plate 4, one end of the spring is secured to one of the screws 5, the other end being secured in a suitable manner to pin 10 of rotor 7.

Operation of the fuze forming the subject matter of this invention is as follows: In the unarmed condition, pin 10 of rotor 7 occupies a position as shown in FIG. 1, being retained in the notch of lever 12 and at the upper end of arcuate slot 8. Lever 12 is locked in this position by its nose engaged in hole 13 of cover plate 4 and by a component of the force exerted upon it by pin 10 which is urged by the action of spiral spring 14, under stress, to travel down slot 8. FIGS. 1 and 2 show the relation of the parts of the fuze in the unarmed position with detonator 9 in a plane normal to the projectile axis, as indicated by dotted lines in FIG. 1. If by reason of a firing pin 15, represented schematically in FIG. 1 at the left end of cage 3, is caused to move forward it would not strike percussion detonator 9, but a metallic part of rotor 7, so that absolute safety as to premature actuation of the fuze is insured.

Upon discharge of the projectile the propellant gases generated, for example, by the combustion of a cartridge powder charge, impinge upon piston 11 in such a way as to force it forward, the piston rod causing pivoting of the lever 12 about fulcrum 5. This way pin 10 is free to travel down arcuate slot 8, being urged by spring 14, and making the rotor 7 revolve simultaneously. When pin 10 retainably abuts the lower end of arcuate slot 8, rotor 7 occupies a position adapted to align detonator 9 with the projectile axis. This relation of the parts of the fuze is shown in FIGS. 3 and 4. Upon impact of the projectile on the target, firing pin 15 is by inertia or otherwise thrown forward and strikes detonator 9, which explodes and sets off the main charge 2 either by a direct blast or by means of a suitable auxiliary charge 16, which could be made integral with cage 3.

After understanding the invention the attendant advantages presented by it, will be readily appreciated, especially the following ones:

(a) An unlimited safety in the unarmed position of the fuze;

(b) Easy and effective time setting of the fuze by appropriately determining the length of arcuate slot 8 and the rotating angle of detonator 9, the strength of spiral spring 14, and the inertia moment of rotor 7;

(c) A wide range of applications since the invention

is liable to be applied to various kinds of fuzes. In the case of an electric fuze, for example, not comprising a firing pin 15, the detonator can be short-circuited in the unarmed position and connected into circuit after a suitable rotation of its holder.

I claim:

1. A fuse for projectiles comprising a housing having a bore therein, an arming rotor in said bore rotatable from an unarmed position to an armed position, a cover for said housing and adjacent the rotor, said cover having an arcuate peripheral slot therein, a setting pin mounted in said rotor and extending into and through said slot, blocking means for said pin rotatably mounted on the cover, means connected to said blocking means to free said pin relative to said housing so that the latter will rotate said rotor into the armed position, and spring means connected to the cover and the pin to urge the pin to slide in the slot from the unarmed to the armed position of the rotor.

2. A fuse according to claim 1, in which said blocking means is in the form of a lever one end of which is rotatably mounted on the cover and the other end is provided with a nose engaged in a hole in said cover, and said lever having a notch therein intermediate its ends to receive said pin and retaining it at the upper end of said arcuate slot against the force of the spring means.

3. A fuse according to claim 2, wherein a piston rod is slidably mounted in the fuse and in contact with said lever, said piston rod being actuated by the propellant gasses of said projectile to pivot said lever out of engagement with said pin which is then urged to slide in said arcuate slot by said spring means, thus simultaneously rotating said rotor from the unarmed to the armed position.

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