

Nov. 7, 1961

C. L. PIPER ET AL
PROJECTILE STABILIZER

3,007,411

Filed March 11, 1955

FIG. 1

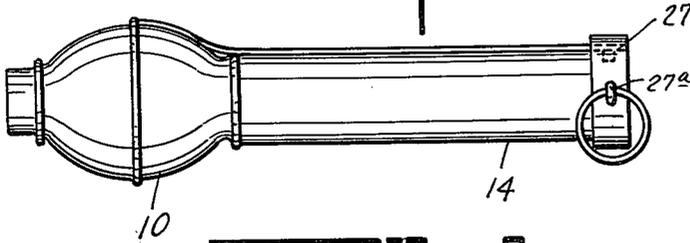


FIG. 2

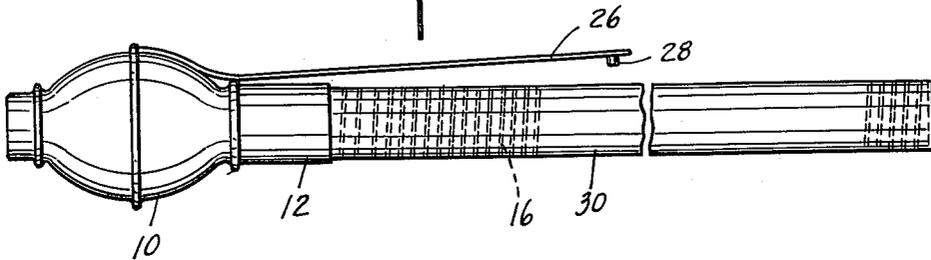
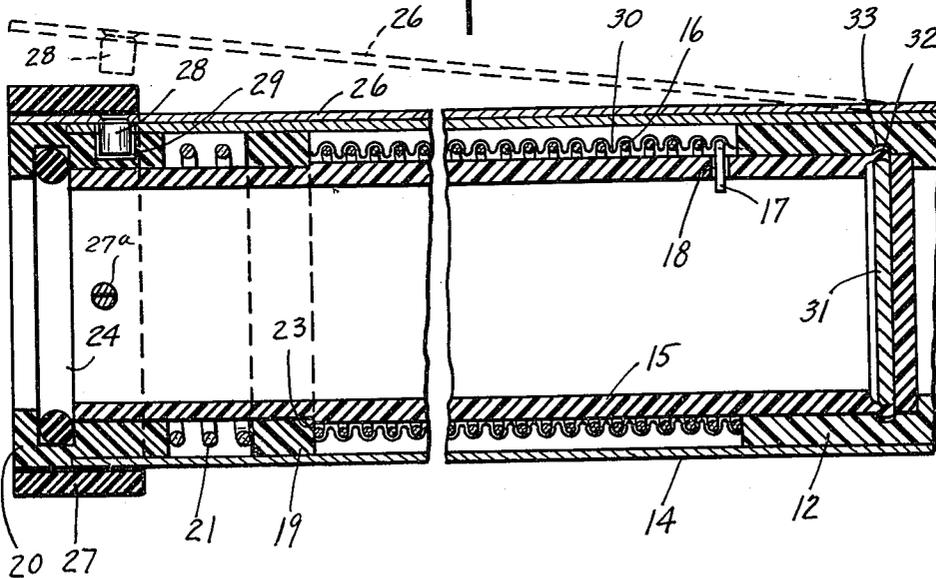


FIG. 3



INVENTORS.
CHESTER L. PIPER.
ROBERT J. VOKE.

BY

Lockwood, Calt, Woodard & Smith.
ATTORNEYS.

1

3,007,411

PROJECTILE STABILIZER

Chester L. Piper, New Haven, and Robert J. Voke, Fort Wayne, Ind., assignors to The Magnavox Company, Fort Wayne, Ind., a corporation
Filed Mar. 11, 1955, Ser. No. 494,024
4 Claims. (Cl. 102-50)

This invention relates generally to low velocity projectiles or missiles and more particularly to stabilizing devices for low velocity projectiles or missiles, such for example as air borne missiles or hand grenades.

While conventional low velocity projectiles or missiles have been provided with various types of stabilizing apparatus, it is known that conventional stabilizing apparatus creates appreciable drag forces on the missile. Thus, projectile range would be decreased to a substantial degree. Also, conventional stabilizing apparatus is relatively slow to nullify spin or tumble energy. Because of the delay in stabilization, accuracy of firing might be impaired and, in fact, detonation of the missile might be prevented at short ranges due to the fact that it contacted a target prior to stabilization along the direction of travel of the missile.

Accordingly, the principal object of this invention is to provide a stabilizing apparatus for low velocity projectiles or missiles which introduces relatively low drag forces, and which nullifies spin or tumble energy within a relatively short distance along the trajectory.

Still another object of this invention is to provide a stabilizer for low velocity projectiles or missiles which functions to release arming mechanism whereby the projectile or missile may be unarmed until it is stabilized, thus to insure that the detonation means can not function because of unbalanced forces due to tumble or yaw.

Still another object of this invention is to provide stabilizing apparatus for relatively low velocity projectiles or missiles which is effective to cause the projectile or missile to travel with its axis approximately parallel to its trajectory, thereby insuring that the nose of the grenade will impact the target and thereby making it relatively safe to use a simple inertia operated firing and detonation mechanism.

In accordance with this invention there is provided a stabilizing apparatus for relatively low velocity projectiles and missiles which comprises a normally compressed spring member attached to the projectile or missile, and release means operative subsequent to launching of the projectile or missile to permit expansion of said spring, thereby to create reactive forces effective to stabilize said projectile or missile with its axis in approximate alignment with its trajectory.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

FIG. 1 is a side elevation view of a hand thrown grenade embodying this invention.

FIG. 2 is a side elevation view of the projectile or missile illustrated in FIG. 1 showing the stabilizing apparatus in the released position.

FIG. 3 is an enlarged longitudinal cross section view illustrating the stabilizing apparatus in compressed position, as shown in FIG. 1.

This invention is applicable to low velocity projectiles or missiles such for example as rifle launched or manually launched grenades. Accordingly, the stabilizing apparatus as provided in accordance with this invention is illustrated as a part of a hand grenade. It will readily be understood that the invention may be applied to various types of relatively low velocity projectiles or missiles.

Referring to FIG. 1, a hand grenade 10 includes an

2

adaptor 12 fastened in any suitable fashion to the outer casing of the grenade. Mounted exteriorly of the adaptor 12 is a spring cover tube 14, and interiorly of adaptor 12 there is mounted a tail tube 15 secured to adaptor 12 by means of disc 31 force fitted into a groove 32 to expand the end of tail tube 15 into groove 33 of adaptor 12. The spring cover tube 14 may serve as a throwing handle for launching the grenade by hand, while the tail tube 15 supports a normally compressed coil spring 16, one end of which includes a hook portion 17 inserted within a hole 18 in the tail tube 15, and the other end of which is held in fixed position by means of an annular ring member 19.

In order to confine the spring member 16 in compressed position, there is provided a tail cap 20 fitted within the outer end of the spring cover tube 14. The tail cap acts through a relatively strong kick spring 21 which is fitted over the tail tube 15 to hold the annular ring 19 in engagement with a shoulder 23 formed on the external surface of the tail tube 15. For providing a seal between the inner surface of the tail cap 20 and the outer surface of the tail tube 15, there is provided an O-ring 24. Tail cap 20 has a sliding fit with respect to tail tube 15, whereby it may be released and kicked off the tail tube. The O-ring serves to prevent seepage of moisture or penetration of dirt between the spring cover tube 14 and the tail tube 15.

In order to hold the tail cap 20 in the position shown in FIG. 3 with the springs 16 and 21 in compressed position, there is provided a manually operable release spring 26 which may be normally mounted at one end by any suitable means (not shown) on the exterior surface of the casing of grenade 10. An outer ring member 27 may be fitted over the tail cap 20 and the outer rim of the spring cover 14 for the purpose of clamping the release spring 26 to the exterior surface of the spring cover 14 with a pin member 28 nesting within a socket 29 formed in the tail cap 20. A cotter pin 27a may be passed through the tube 15, cap 20, cover 14, and member 27 thereby to prevent member 27 from accidental removal from its clamping position. With the ring member 27 in position shown in FIGS. 1 and 3, tail cap 20 is held in position on the spring cover 14, thereby to prevent springs 16 and 21 from expanding.

The spring member 16 forms the stabilizing member when the grenade is thrown and in order to enhance the stabilizing drag effect, it is provided with a light fabric or gauze cover 30.

The stabilizer as provided in accordance with this invention is also effective to provide a means of arming the grenade after it is thrown. In order to accomplish this function, the spring cover tube may be slideably mounted over the adaptor 12, but it will be noted that it is locked in position by means of spring 26 and pin 28. As will be explained subsequently, spring cover 14 is dismounted from adaptor 12 when the grenade is launched, and at this point it may be provided that the arming pin (not shown) may be released as the spring cover tube 14 slides from adaptor 12. An arming pin may be confined within adaptor 12 by cover 14 so that the pin may be ejected from its "safe" position when cover 14 is dismounted.

In operation cotter pin 27a may be withdrawn and the ring 27 may be removed from the tail cap 20, while holding the grenade and clasping the hand about the release spring 26. This maintains the pin 28 in position to prevent expansion of springs 16 and 21.

As soon as the grenade is thrown and loses contact with the thrower's hand, spring 26 moves outwardly of the spring cover 14, and pin 28 moves out of slot 29, whereupon spring 21 is effective to kick tail cap 20 off the outer end of the tail tube 15. Simultaneously, tail

3

cap 20 carries the spring cover 14 with it, thereby to arm the grenade as explained previously. The spring 16 is released and expands, kicking the kicker spring 21 and the ring member 19 off the outer end of the tail tube 15, thus forming an elongated tail and stabilizer for the grenade, as shown in FIG. 2.

When the spring 16 expands, the expanding action creates reactive forces which tend to overcome any spin or tumble energy. Also, after the spring has expanded, the fabric covering acts as a drag to further stabilize the flight of the grenade. Within a very short distance from the launching point, a grenade will have been stabilized so that its axis is approximately parallel to its trajectory. This insures that the nose of the grenade will impact the target and makes it possible to utilize a firing and detonating mechanism such, for example, as an inertia operated firing pin. Any need for a firing mechanism actuated by shock from any direction is entirely eliminated.

The invention claimed is:

1. A stabilizer for relatively low velocity projectiles or missiles comprising an adaptor member which may be mounted to a portion of said projectile or missile to extend outwardly thereof, a tubular member mounted on said adaptor and extending outwardly thereof, a coil spring stabilizer attached to and mounted over said tubular member and having a fabric cover thereon, said spring stabilizer being adapted to expand outwardly of said tubular member to counteract tumbling and yawing forces, a cover member slideably mounted on said adaptor over said stabilizer and coextensive therewith, a ring assembly attached to said cover member and slideably mounted on the tubular member in compressive engagement with said stabilizer for holding said stabilizer in compressed position, a release member mounted in fixed relation to said projectile or missile and in locking engagement with said ring assembly for holding said ring assembly in spring compressing position, and an external ring member engaging said release member for holding it in said locking engagement and removably mounted on said cover member to permit unlocking of said release member, thereby to permit removal of said cover and said ring assembly and expansion of said stabilizer.

2. A stabilizer for relatively low velocity projectiles or missiles comprising a tubular member which may be mounted to a portion of said projectile or missile to extend outwardly thereof, a coil spring stabilizer attached to and mounted over said tubular member, said spring stabilizer being adapted to expand outwardly of said tubular member to counteract tumbling and yawing forces, a cover member slideably mounted over said stabilizer and coextensive therewith, means attached to said cover member in compressive engagement with said stabilizer

4

for holding said stabilizer in compressed position, a release member mounted in fixed relation to said projectile or missile and in locking engagement with said means for holding said means in spring compressing position, and an external ring member engaging said release member for holding it in said locking engagement and removably mounted on said cover member to permit unlocking of said release member, thereby to permit removal of said cover and said means and expansion of said stabilizer.

3. A stabilizer for relatively low velocity projectiles or missiles comprising a guide member which may be mounted to a portion of said projectile or missile to extend outwardly thereof, a spring stabilizer attached to and mounted over said guide member, said spring stabilizer being adapted to expand outwardly of said guide member to counteract tumbling and yawing forces, a cover member slideably mounted over said stabilizer and coextensive therewith, a stabilizer retainer member attached to said cover member in compressive engagement with said stabilizer for holding said stabilizer in compressed position, a release member mounted in fixed relation to said projectile or missile and in locking engagement with said retainer member for holding said retainer member in spring compressing position, and an external means engaging said release member for holding it in said locking engagement and displaceably mounted on said cover member to permit unlocking of said release member, thereby to permit removal of said cover and said retainer member and expansion of said stabilizer.

4. A stabilizer for relatively low velocity projectiles or missiles comprising a coil spring stabilizer for attachment to a portion of said projectile or missile to extend outwardly thereof, said spring stabilizer being adapted to expand and counteract tumbling and yawing forces, a cover member slideably mounted over said stabilizer and coextensive therewith, means mounted on the cover member in compressive engagement with said stabilizer holding said stabilizer in compressed position, a release member mounted in fixed relation to said projectile or missile and in locking engagement with said means for holding said means in spring compressing position, and means engaging said release member for holding it in said locking engagement and mounted on said cover member to permit unlocking of said release member, thereby to permit expansion of said stabilizer.

References Cited in the file of this patent

UNITED STATES PATENTS

1,330,425 Bergman ----- Feb. 10, 1920

FOREIGN PATENTS

576,069 France ----- May 5, 1924