July 18, 1961 C. L. CRITCHFIELD ET AL 2,992,612

PROJECTILE

Filed July 14, 1944

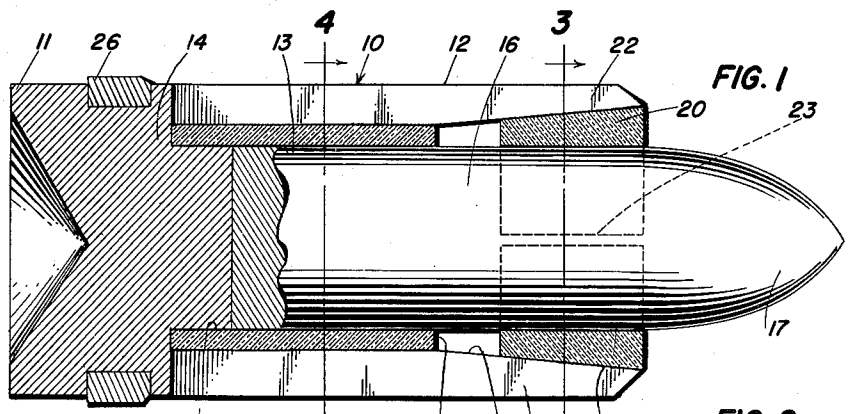


FIG. 1

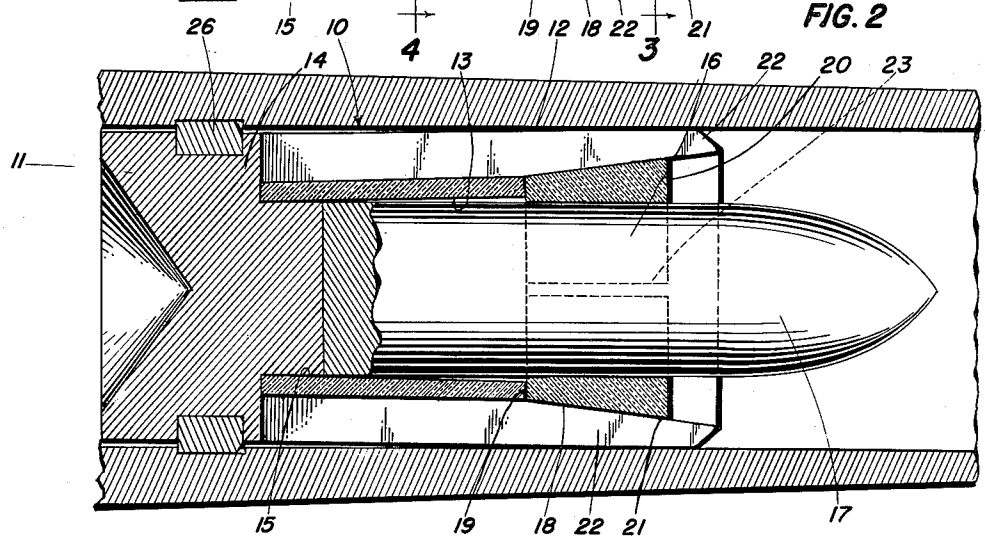


FIG. 2

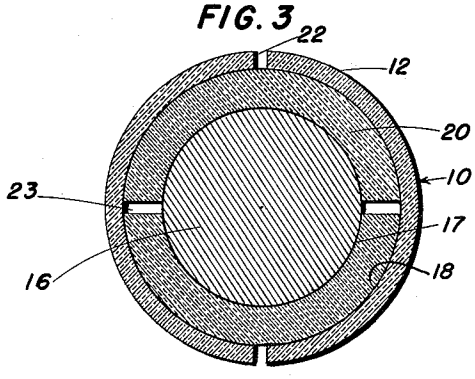


FIG. 3

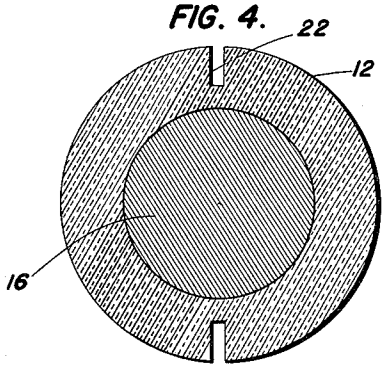


FIG. 4.

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PROJECTILE

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1 Claim. (Cl. 102—93)

This invention relates to projectiles for guns and more particularly to a novel sabot type of projectile especially adapted for attaining extremely high velocities when fired from a gun.

Generally the sabot type of projectile is a projectile having a subcaliber projectile core adapted for firing from a rifled gun of full caliber. This is made possible by the use of a sabot of substantially full caliber which acts as a bushing or spacer between the wall of the gun bore and the aforesaid projectile core. By employing a sabot, therefore, a subcaliber projectile core can be fired from a full caliber gun, the higher pressures developed therein being used to produce higher muzzle velocities than would ordinarily be possible in a gun equal in caliber to the subcaliber projectile core. Immediately after clearing the muzzle it is intended that the sabot be discarded to reduce air resistance.

In view of the foregoing it can be seen that this type of projectile has advantages which justify its use, but due to functional difficulties encountered in the past it has not been used extensively.

The sabot usually is made of a light material such as aluminum alloy or plastic which, due to its yieldability under centrifugal force, does not provide proper axial centering means for the projectile core. This results in the sabot projectile as a whole tending to yaw while still within the gun bore as the projectile core becomes eccentric with respect to the axis of the gun bore. Also, difficulty has been encountered in the prompt discard of the sabot after it has cleared the gun. In certain types of projectiles the releasing of the sabot tends to upset the equilibrium of the projectile core causing it to veer from its course with the resulting possibility that it will miss the target.

One of the principal objects of the invention is to provide a sabot projectile having means for maintaining a well centered fit of the projectile core in a gun bore during movement therethrough.

A projectile made in accordance with the invention comprises a sabot including a base plug and a sleeve, both of a full caliber diameter, the base plug abutting the after end of a subcaliber projectile core. The sleeve tightly surrounds the subcaliber wall of the projectile core, leaving an ogive portion protruding therefrom in a forwardly direction. A camming ring is mounted in the front portion of the sleeve in an internal annular recess which is tapered rearwardly. The camming ring has an axial bore of a diameter substantially equal to that of the projectile core to provide a centering means operable during setback. The peripheral wall of the camming ring is tapered to conform to the wall of the aforesaid recess. Longitudinally of the sleeve and in symmetrically spaced relationship are radial cuts, providing zones of weakness to insure prompt discard of the sleeve. Radial cuts in the camming ring are also provided to aid in its discard.

When the sabot projectile is fired from a gun, the pressure developed in the powder chamber forces the projectile forwardly, the rifling in the gun bore engraving the turning band to produce a spinning of the projectile. The force of setback resulting from acceleration of the projectile causes the camming ring to shift rearwardly and, through the tapered surfaces, to expand the sleeve

or skirt against the gun bore, thereby centering the projectile core in the gun bore and compensating for radial clearance and compressibility of the sabot. The projectile core is thus centered in its travel through the gun bore. Upon clearing the gun, the weakened zones or radial cuts allow the sabot and camming ring to break apart for discarding thereof under centrifugal force, the symmetry and precision of the radial cuts providing for simultaneous release or breaking of all segments.

Another object of the invention is the provision of a sabot type projectile which is stable both before and after leaving the gun bore.

A still further object of the invention is the provision of a sabot projectile which is of relatively simple construction and which is highly efficient functionally.

These and other objects will be better understood by reference to the drawing and the following detailed description.

In the drawing:

FIG. 1 is a longitudinal sectional view of one form of the invention, some parts thereof being shown in elevation;

FIG. 2 is a longitudinal sectional view partly in elevation showing the projectile in operation;

FIG. 3 is a transverse sectional view taken on line 3—3 of FIG. 1, and

FIG. 4 is a transverse sectional view taken along line 4—4 of FIG. 1.

Referring to the drawing, and more particularly to FIG. 1 thereof, numeral **10** indicates generally a sabot for a subcaliber projectile core **16**. The core **16** has an externally uniform and uninterrupted surface, that is to say it is devoid of grooves and the like, making it particularly adaptable to armor piercing. The sabot comprises a base plug **11** and a sleeve **12** having an axial bore **13**, the rear end of which engages a shoulder **14** of the base plug **11**. The shoulder **14** is formed by the difference in size of the major and reduced portions of the base plug, it being noted that the major portion substantially fits the gun barrel thus to receive the full impact of the powder gas. The engagement between the base plug and the sleeve at what delineates a recess **15** may be a pressed fit, as shown, or the two elements may be threaded together. Occupying the bore **13** is the subcaliber projectile core **16** which is securely held within the bore by either a forced fit or threading. The sleeve **12**, therefore, provides a coupling because of the tight fit that it has commonly on the base plug and core. The projectile core **16** is cylindrical in shape over the greater part of its length with the forward end portion terminating in an ogive **17**. The ogive portion **17**, in assembly, protrudes beyond the forward end of the sleeve **12**.

At the forward end portion of the sleeve **12** is an internal, tapered recess **18**, the diameter of which decreases as it extends rearwardly to define a shoulder **19**. Closely surrounding the cylindrical portion of the projectile core **16** and in sliding engagement therewith is a camming ring **20**, the periphery **21** of which is tapered to correspond to the taper of the recess wall **18** which it engages.

Radially of the sleeve **12** and the camming ring **20** are symmetrically spaced and longitudinally extending cuts **22** and **23** for providing zones of weakness to facilitate the release of the sleeve.

A turning band **26** secured to the base plug **11** in any conventional manner provides means for rotating the projectile as it moves along the rifled gun bore.

The projectile parts normally assume the positions shown in FIG. 1. In operation, however, when the gun is fired, the projectile will move forwardly in the gun bore (FIG. 2) and will be rotated by the action of the

rifling on turning band **26**. The force of setback on the cam ring **20**, due to acceleration of the projectile, moves the cam ring rearwardly and through the tapered surfaces **18**, **21** expands the sleeve **12** into contact with the wall of the gun barrel. In this way, axial centering of the projectile core **16** is maintained throughout the entire length of the gun barrel. When the sabot projectile emerges from the barrel, the sabot in its entirety is discarded, the sleeve **12** and ring **20** breaking apart under centrifugal force. The discarding operation occurs immediately after the projectile has cleared the gun, at which time the sleeve **12** will be expanded to a point where it will be fractured along the radial cuts provided for such purpose. Inasmuch as the aforesaid radial cuts are positioned symmetrically and are uniformally cut with respect to depth, all segments will be discarded together, eliminating the possibility of disturbing the balance of the projectile. Upon discard of the sleeve **12**, the base plug **11** will become detached from the projectile core due to the greater air resistance on the plug.

We claim:

A missile comprising a subcaliber projectile as the core thereof, a full caliber tubular sabot providing a frictionally engaging sleeve about said core, said sabot being slotted along substantially the axial extent thereof and to a depth less than the radial extent of the sabot material to substantially weaken said sabot to the action of centrifugal forces, said sabot being formed with an inner conical recess in the forward portion thereof, and a tapered camming ring substantially complementary to said conical recess slidably mounted on said core within said recess, firing of said missile from a rifled gun thereby causing said ring to cam the conically recessed portion of said sabot into close engagement with the gun barrel, and the spin imparted by the barrel causing the weakened sabot to disintegrate upon leaving the barrel.

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