Sept. 5, 1961 C. E. HABLUTZEL 2,998,778

SABOT RETAINER

Original Filed Aug. 2, 1945

FIG. 1

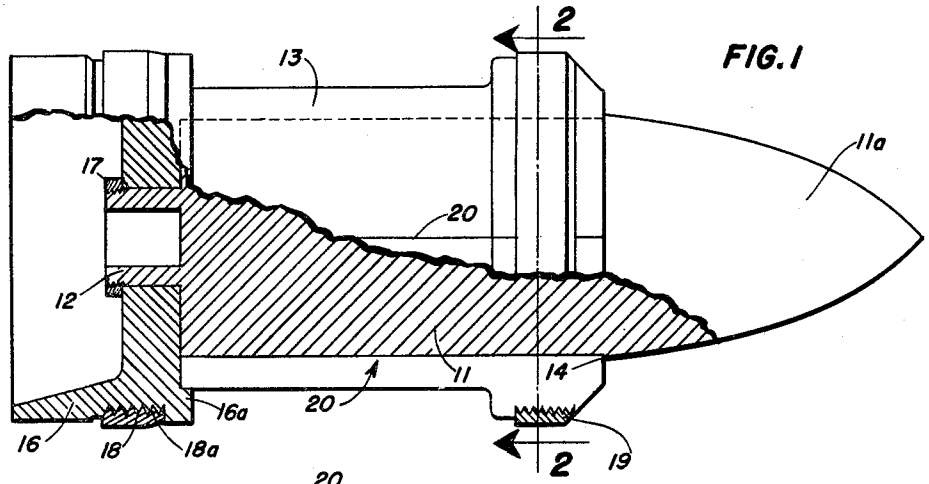


FIG. 2

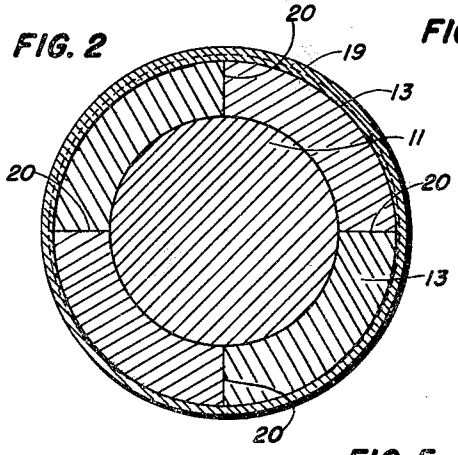


FIG. 3



FIG. 4



FIG. 5

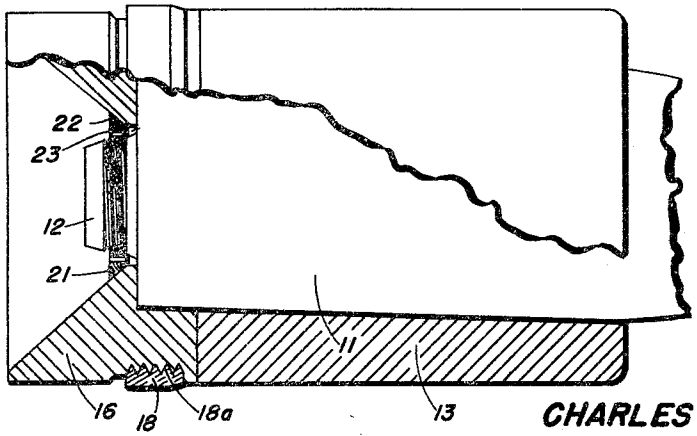


FIG. 6

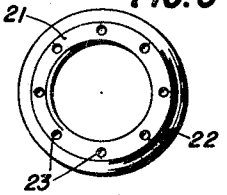
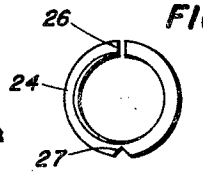


FIG. 7



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SABOT RETAINER

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Original application Aug. 2, 1945, Ser. No. 608,598. Divided and this application May 7, 1953, Ser. No. 353,462

1 Claim. (Cl. 102—93)

This invention relates to projectiles for guns and, particularly, to sub-caliber projectiles which include a releasable sabot. This application is a division of copending application Serial No. 608,598 filed August 2, 1945.

In projectiles having a sub-caliber core and a releasable sabot, a difficulty frequently encountered is that of holding the component parts of the projectile together prior to loading into the gun, without impairing proper release of the sabot after firing. This difficulty was to a degree dealt with in some cases by assembling the projectile parts somewhat loosely. In such projectiles, however, considerable trouble is sometimes encountered in handling, as in packing operations at the factory or while unpacking or loading in the field. Unless particular care is observed, the component elements frequently separate, in which event it is easily possible that some of the elements will be lost or damaged. At best, considerable time must be consumed in reassembling the separated elements, and in service use this is a serious disadvantage. Even where provision is made for positive retention of the projectile parts, a further problem arises in obtaining release of the sabot early in its flight after firing.

Accordingly, an object of the invention is to provide a projectile in which a sub-caliber core and a sabot are locked in assembled relationship, the sabot being releasable after the projectile is fired without deflecting the core from its established flight path, but being firmly held on the core prior to firing.

Another object of the invention is the provision of a projectile in which a sub-caliber core and sabot are positively held in assembled relationship in such a manner as to overcome the above described difficulties, and are conditioned for separation under shock, heat, or centrifugal force, all of which are natural consequences of firing a projectile.

A further object of the invention is to provide a projectile of the character referred to above which is simple to manufacture and is adapted to large quantity production.

Other and ancillary objects and advantages of the invention will be apparent from the following specification and the accompanying drawing in which:

FIG. 1 is a side elevational view, partly in section, of a preferred form of the invention;

FIG. 2 is a cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a longitudinal-sectional view of the rotating band;

FIG. 4 is a longitudinal-sectional view of the forward bearing ring;

FIG. 5 is a side elevational view, partly in section, of a modified form of sub-caliber projectile, showing one form of sabot retaining ring covered by the present invention;

FIG. 6 is a plan view of one form of sabot retaining ring of the present invention;

FIG. 7 is a plan view of another form of sabot retaining ring.

The projectile assembly in the form illustrated includes a substantially cylindrical sub-caliber core and a sabot in the form of a cup or base plate fitting about the rear portion of the core and locked to the core by means of a

retaining ring which is destructible under at least one of the conditions incidental to firing a projectile from a gun.

Referring to FIGS. 1 through 4 of the accompanying drawing, the projectile there shown comprises a sub-caliber core **11** having an ogive nose portion **11***a* and an axially extending rear hub or fuze plug **12** of reduced diameter which may be integral with the core or suitably secured thereto. An elongated cylindrical bourrelet **13** which may be made of reinforced plastic, dural, light metal, fibre, or the like, is mounted on the body of the core over most of the core length except for the ogive portion. In order to prevent the bourrelet from sliding forwardly over the ogive of the projectile core during handling, there is preferably provided a stop **14**, which, as shown in FIG. 1, comprises an annular shoulder on the projectile core immediately in advance of the bourrelet.

A sabot **16** fits loosely over the hub **12** and is held firmly against the rearward face of core **11** by retaining ring **17** threaded to the rearmost end of hub **12**. A rotating band **18** of copper or other suitable material is mounted by press fitting or by other suitable means in annular grooves **18***a* on the periphery of the sabot. The retaining ring **17** presses against the sabot **16** and holds the sabot and sub-caliber projectile firmly together. The sabot extends over the rearward end of the bourrelet as shown and effectively retains the bourrelet in snug contact with the sub-caliber core **11**. Ring **19** of steel or other suitable materials is threaded on the forward end of the bourrelet **13** and acts as a front bearing surface between the bourrelet and the gun bore.

If desired, the bourrelet **13** may contain longitudinal slots **20** dividing it into three or more segments, the segments being held together on the sub-caliber core in front by the bearing ring **19** and in the rear by sabot **16**. Alternatively, slots **20** may be terminated at a distance from the rearward end of bourrelet **13** leaving an uncut portion (undesignated) to break under the centrifugal force which is imparted to the projectile by the rifling of the gun barrel when the projectile is fired.

The projectile depicted in FIG. 5 is similar to that shown in FIG. 1 and contains substantially the same parts with the exception of the forward bearing ring **19**. The sabot retaining ring employed in this modification, however, is somewhat different in design from that shown in cross-section in FIG. 1, and is illustrated in plan view in FIG. 6. The ring **21** has a tapered surface **22** adapted to cooperate with a corresponding taper on the rearward sabot surface when the ring **21** is threaded tightly upon hub **12** of core **11**. The ring is composed of a combustible material, for example, magnesium, and is adapted to burn rapidly upon contact with the hot gases of combustion of the propellant powder. Perforations **23** are provided to expose a greater surface of the ring **21** to the hot gases, thereby assuring more rapid destruction of the ring by burning.

Another modification of the sabot retaining ring is shown at **24** in FIG. 7. This ring is composed of steel or other such relatively strong material but is greatly weakened by a complete break **26** and a notch **27** located diametrically opposite the break. The ring **24** is sufficiently rigid under static conditions to secure the sabot and the bourrelet against any relative movement with respect to the sub-caliber core in ordinary handling or loading operations. Upon firing of the projectile, however, the centrifugal force imparted to the projectile causes the ring **24** to open at its point of the break **26** to release the sabot and the bourrelet from the core. The opening action of the ring is greatly facilitated by the notch **27**; this results in almost immediate detachment of the ring and, consequently, the sabot and bourrelet, after the projectile has left the muzzle of the gun.

When the sub-caliber projectile is fired from a gun, the rotating band **18** engages the rifling of the gun barrel, and, due to the high pressure of the sabot **16** against the core **11**, the rotation imparted to the rotating band is in turn transmitted by the sabot to the core. Proper axial alignment of the entire projectile assembly within the gun barrel is maintained by contact of the bearing ring **19** with the lands of the rifle bore. The dynamic conditions set up in the projectile when it is fired, and the hot powder gases resulting from such firing, act either singly or in cooperation to release the sabot and the bourrelet from the sub-caliber core immediately after the projectile has emerged from the muzzle of the gun. This separation can occur in a number of different ways some of which will now be given by way of illustration. When the sabot ring, for example ring **21**, is composed of a combustible material such as magnesium, the hot gases of combustion of the propellant charge causes the ring to ignite immediately upon firing. The ring is thus quickly destroyed releasing the sabot and the bourrelet which are swept from the core by wind resistance or thrown therefrom by centrifugal force. When a low melting substance, such as lead or any of the well-known fusible alloys, is used in the ring composition, releasing action of the sabot and bourrelet from the core is effected by melting the ring in the hot gases resulting from combustion of the propellant. In the foregoing two modifications of the sabot retaining ring the melting or burning action of the ring is greatly facilitated by the presence of a number of perforations **23** in the ring permitting greater access thereto by the hot gases. Of course,

where the substance of the ring is both combustible and fusible, both of these effects will cooperate to bring about an even quicker destruction of the sabot retaining ring, and such action is contemplated by the invention.

Other modifications of the invention include sabot retaining rings composed of low-strength substances, such as plastics, which disintegrate upon firing, or sabot retaining rings composed of relatively strong material, such as that depicted in FIG. 7, but which are deliberately weakened to cause their disintegration under centrifugal force.

While what has been described is particularly illustrative of a presently preferred embodiment of my invention, it is not intended that the scope of the invention be limited thereto but that it embrace any modifications and changes which fall within the true spirit of the invention, as covered by the appended claim, occurring to those skilled in the art.

I claim:

In a projectile having a sub-caliber core and a sabot thereon, a threaded appendage on said projectile extending loosely through said sabot and a split collar threaded upon said appendage to fix said sabot to said projectile, said collar having a weakened portion opposite the split on said collar and adapted to open under centrifugal force to release said sabot from said core.

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