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DISCARDABLE ROTATING BAND

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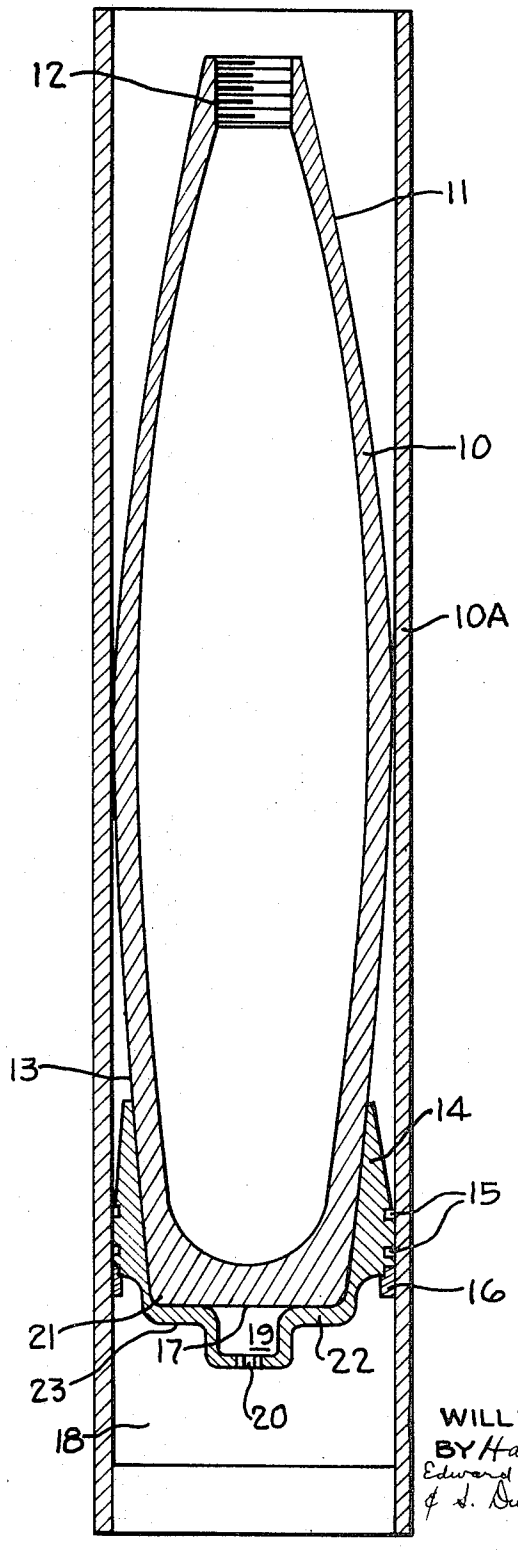

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DISCARDABLE ROTATING BAND

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ABSTRACT OF THE DISCLOSURE

A gas operated discardable rotating band assembly for projectiles is provided with a chamber for the storage of projectile propulsion gases which separate the assembly from the projectile upon emergence of the projectile from a gun barrel.

The invention described herein may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The weapon art is replete with projectile spin imparting devices which are designed to separate from the projectile while in flight. These devices, commonly known as sabots, generally employ centrifugal forces acting on radially weakened sections to achieve separation. The disadvantages of these devices lie in the complexity of their structure and the high manufacturing costs concomitant therewith.

It is, therefore, an object of this invention to provide a simple and inexpensive discardable rotating band assembly which facilitates projectile manufacture.

Further objects, features, and advantages may be seen by a perusal of the accompanying specification taken in conjunction with the following drawing which is a sectional view along a projectile longitudinal axis showing a typical projectile embodying principles of the invention.

A projectile body **10**, shown positioned in a gun barrel **10A**, has a tapered forward nose portion **11** and a tapered rearward portion **13**. Forward portion **11** is drilled and tapped at **12** to receive a conventional arming or fuzing device, not shown.

Projectile body portion **13** is rearwardly tapered aft of its maximum diameter **17A** to form a frustrum which has a minor surface **17** located transversely to projectile longitudinal axis A—A. Along the intersection of tapered surface **13** and minor surface area **17**, a typical radius **21** is formed. Radius **21** reduces stress concentrations in the projectile rearward portion as well as enhances the flight characteristics of the projectile.

A cylindrically shaped rotating band casing **14**, preferably made from steel, is internally tapered to mate with projectile tapered surface **13**. This internal taper permits casing **14** to be forced or pressed onto projectile rearward portion **13** to facilitate projectile manufacture. Casing **14** has grooves **15** in its outer peripheral surface which grooves receive rotating band **16**. Rotating band **16** is preferably made from a soft metal such as brass or copper, however other conventional band materials may be used where warranted by particular design considerations.

A chamber **19** is formed between projectile minor surface **17** and a centrally offset inner surface portion **18** of the transverse casing wall **22**. As a skilled artisan would readily perceive, casing wall **22** must be of sufficient strength to withstand combustion pressures with particular design parameters depending upon various factors including combustion pressures, projectile accelerations and the like. Chamber **19** communicates with the projectile exterior through port or vent **20** which is located in casing wall **22** coaxial with projectile axis A—A.

Port **20** has a diameter large enough to permit propulsion gases to be bled into chamber **19** and to achieve equilibrium with propulsion gases acting on casing outer surface **23** prior to emergence of the projectile from the gun barrel. Its diameter must also be small enough to retain the gas pressure in chamber **19** until that pressure separates the casing from the projectile. To achieve these results port diameters should not exceed $\frac{1}{12}$ of the maximum diameter of the projectile nor should they be less than $\frac{1}{24}$ of the projectile maximum diameter.

In operation, projectile **10** and an appropriate propellent charge are placed in a suitable gun and the propellant is detonated. Gases formed by the detonated propellant exert a pressure on band casing surface **23** to urge the projectile outwardly of the gun barrel. A portion of these gases is bled into chamber **19** through port **20** substantially simultaneously upon detonation, and the pressure of the propulsion gas within chamber **19** rapidly reaches equilibrium with the gas pressure acting on casing surface **23**. The gas within chamber **19** remains under this pressure equilibrium until the projectile leaves the barrel at which time the pressure acting on surface **23** is reduced to atmospheric while the pressure in chamber **19** is substantially unchanged. This pressure differential exerts a force between casing surface **18** and projectile surface **17** which overcomes the frictional forces of the press fit to urge casing **14** rearwardly apart from the projectile. The assembly, thus separated from the projectile, falls to earth.

I claim:

1. In a gun barrel containing a projectile, said barrel having a substantially uniform cylindrical internal surface, said projectile having a tapered forward nose portion and an inwardly and rearwardly tapered rearward portion teminating in a closed rearward end, the combination with said projectile of a discardable rotating band assembly comprising

a rigid cylindrically shaped casing of steel construction slidably mounted within said barrel internal surface and having an open forward end and a portion adjacent said open end in frictional engagement with said projectile rearward tapered portion, said casing defining a gas storage chamber located intermediate said casing closed rearward end and said projectile closed rearward end, said casing closed rearward end having a vent for communicating said chamber with the projectile exterior.

At least one rotating band secured to said casing outer peripheral surface for operatively engaging said gun barrel,

pyrotechnic means for producing a gas to propel said projectile through said gun barrel, said gas being bled into said chamber through said vent while said projectile is within said barrel, said gas within said chamber maintaining sufficient pressure to overcome said frictional engagement and detach said casing from said projectile upon emergence of said projectile from said gun barrel.

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SAMUEL W. ENGLE, *Primary Examiner.*

U.S. Cl. X.R.

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