

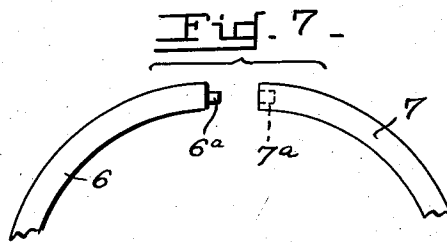
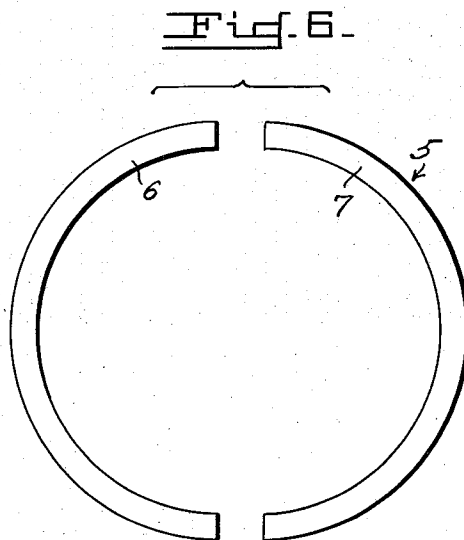
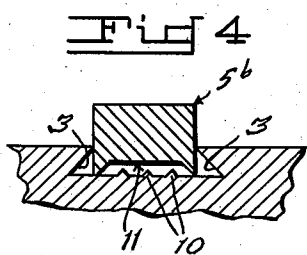
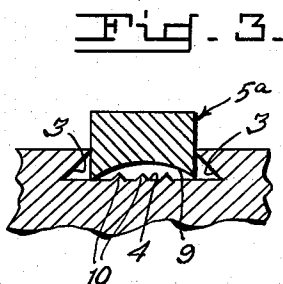
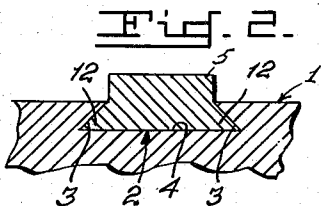
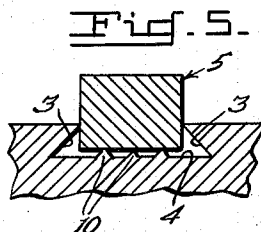
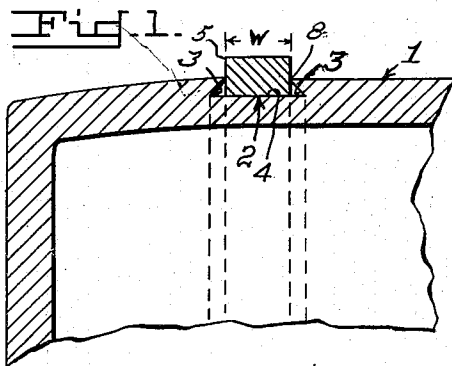
Oct. 21, 1958

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2,856,856

SEGMENTED ROTATING BAND FOR ARTILLERY PROJECTILES

Filed June 2, 1955



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2,856,856

SEGMENTED ROTATING BAND FOR ARTILLERY PROJECTILES

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Application June 2, 1955; Serial No. 512,913

1 Claim. (Cl. 102-93)

(Granted under Title 35, U. S. Code (1952), sec. 266)

This invention relates to a segmented rotating band for artillery projectiles and more particularly to the employment of bands of sintered iron bands or other sintered metals applied to the projectile in two or more segments.

The advantages in the use of gilding metal in rotating bands are well known in view of its plasticity and the ease with which it flows into the grooves during its passage down a rifled barrel. Regardless of whether the barrel is lined, plated with a hardened liner, hardened as by nitriding or not treated at all, the plastic nature of the gilding metal lessens wear, and erosion on the lands and grooves of the barrel.

Notwithstanding its plasticity, rotating bands of gilding metal are not always suitable under certain conditions, such as the fast loading and rapid firing inherent in automatic rifles. The explanation of this is simple. Under comparatively slow loading and firing, the gilding metal has adequate time to flow into the rifling grooves of the barrel, and since there is a little or no resistance to this flow band pressures do not increase immediately. However if the speed with which the projectile traverses the bore is increased, the gilding metal has insufficient time to flow into the grooves with the result that tremendous pressures are exerted on the barrel wall, to thereby increase material fatigue and relatively early failure of the barrel.

The advantages in a sintered iron band derive from its skeletal or porous structure which permits the metal to give or collapse into the rifling grooves regardless of the speed with which the projectile traverses the barrel bore. For this reason band pressures are lower than those produced by gilding metal bands, and obturation, range and accuracy for any fixed round of ammunition, and barrel life, are improved.

It is therefore of great importance to maintain the porosity of the sintered iron band during manufacture and assembly into the completed round. Where a band is formed as a continuous ring it must be fabricated with an inner diameter a little greater than the outer diameter of the finished projectile. Thereafter the band is deformed into place to tightly engage the band seat or channel in the projectile. This procedure is satisfactory in the case of bands of gilding metal. With sintered metal bands, however, this forcing and deformation effects a change in the skeletal structure and destroys to a large extent the porosity of the band and the advantages otherwise offered by the porosity of sintered iron or bronze. As a result the band does not lend itself as readily to engraving during firing, and destroys to a large extent the advantages to be gained by decreased pressures of bands of sintered metal.

With the present invention, it is proposed to make the band in at least two arcuate segments, each segment to curve in the direction of its length and conjointly form a complete annular rotating band with an inner diameter approximately the same as the diameter of the band seat or channel of the projectile. The band seat of the projectile is undercut circumferentially at its rear and forward

ward faces to have a dovetail shape in transverse cross section so that the rotating band may be forced into the undercut portions to effect a tight fit and intimate engagement with the channel or undercut portion to maintain the band in its seat under all stresses, particularly centrifugal forces set up by the spinning projectile. By virtue of the fact that the band is split, and can be fabricated to a size closer to its finished outer diameter when seated, forcing and consequent deformation to fit the band into place is minimized and most of its original porosity is retained. The end result is a band which lends itself more easily to engraving as it enters the rifling, thereby decreasing band pressures, improving obturation of propellant gases, increasing muzzle velocity, range and accuracy as well as reducing barrel wear.

It is therefore a primary object of the invention to provide a rotating band formed of at least two segments to form a band having its inner diameter approximately equal to the outer diameter of the band seat of a projectile.

It is another object of the invention to provide a projectile in which the seated rotating bands are of undeformed or substantially undeformed sintered iron or bronze.

Another object is to provide a band of at least two segments to allow fitting of same in an annular undercut groove, formed in a projectile, without the necessity of unduly forcing the band in order to seat same in the band seat groove.

Another object is to provide a rotating band of sintered iron or bronze lending itself readily to engraving by the gun barrel lands and without great band pressure.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing, it being understood, however, that the invention is not to be considered as limited by the specific illustration or description but that such illustration and description constitutes a preferred embodiment of the invention.

In the drawing:

Fig. 1 is a fragmentary sectional view of a rotating band constructed in accordance with the invention and seated in an undercut band groove formed in an artillery projectile prior to seating, and illustrating the manner in which the two or more segments of the band blank fit the band seat without resort to a preliminary seating operation.

Fig. 2 is a fragmentary sectional view of the band of Fig. 1 after the seating operation and illustrating how the undercut portions of the groove are filled with the sintered metal forming an interlock with the projectile.

Fig. 3 is a similar view illustrating a modified band and a modified band seating groove, prior to the seating operation.

Fig. 4 is a similar view of another modification.

Fig. 5 is a similar view of yet another modification.

Fig. 6 is a side elevation illustrating two segments forming a band blank of the invention, and Fig. 7 is a fragmentary side elevation illustrating a method of interfitting the segments together at their respective ends.

In the drawings, 1 indicates generally a projectile, a rearward portion of which is illustrated in Fig. 1. An annular rotating band seating groove indicated generally by 2 is cut in the outer periphery of projectile 1 and is undercut at its rear and forward faces as at 3, to form an annular channel of dove-tail transverse section. The groove 2 is, in the form being described, shown with a cylindrical bottom 4. The numeral 5 indicates generally an annular rotating band of sintered iron or bronze and is split into at least two segments 6 and 7, as seen in Fig. 6. The width W of the segments 6 and 7 is sub-

stantially the width of the outermost transverse dimension 8 of groove 2. Fig. 2 illustrates the shape and position of the band after it has been seated, and prior to firing.

A modified form of a seating groove for the rotating band 5a is illustrated in Fig. 3. The under surface of the band blank is of concave contour transversely of the band as at 9 and annular ribs 10 notched at intervals along their lengths are formed in the surface 4 for firmer anchorage in the groove upon deformation of the band. Another variation of the under surface of band 5b is illustrated in Fig. 4 as at 11, while Fig. 5 illustrates a seating groove similar to Figs. 3 and 4, but having the rotating band with a plain inner cylindrical surface as in Fig. 1. Ribs 10 should be interrupted at intervals. Alternatively ribs 10 may be replaced by a series of prongs which bite into the ring on deformation into the groove. The rotating band is applied by placing the segments 6 and 7 into the channel or groove, a slightly snug fit being provided if desired, to frictionally hold the segments in position, after which the band is deformed into the seated or finished position as Fig. 2, by any suitable procedure such as the use of a ring die.

The segments may be provided with interfitting dowels and bores at the respective ends thereof as indicated upon Fig. 7 at 6a, 7a to frictionally secure the segments together within the channel until fully seated.

Due to the fact that the segmented rings can be fitted directly into the grooves, they are fabricated to a diameter much nearer their final diameter than would be possible were they made in solid or continuous form. Thus they can be forced into the completed position shown upon Fig. 2 with lower radial forces and less deformation and crushing of the cellular or porous structure of the sintered metal. As a result, the completed projectile retains the advantages in the use of metal of this nature to a degree not heretofore attained and the objects previously recited are effected.

It will be noted that the completed segments 6, 7 after sintering have substantially the same inner radius of curvature as the radius of curvature of the bottom of the channel 4. It is also to be noted that the total inner circumferential extent of the segments after sintering and before assembly with the projectile is substantially equal

to the circumferential extent of the bottom of the channel 4.

It is to be understood that the form of the invention herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to, without departing from the spirit of the invention, or the scope of the subjoined claims.

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

Having now fully disclosed the invention, what I claim and desire to secure by Letters Patent is:

15 The combination with a projectile having an annular rotating band channel in its exterior cylindrical surface, both side walls of said channel being undercut, of an annular rotating band of sintered metal split into at least two equiangular arcuate segments, said segments having 20 substantially the same inner radius of curvature as the radius of curvature of the bottom of said channel and being of substantially the same total circumferential extent as the circumferential extent of the bottom of said channel after sintering and before assembly in said 25 channel and being fitted into said channel to form a continuous annular rotating band therein and adapted to completely fill the undercut portions of said channel when radial pressure is applied thereto.

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