No. 815,992. PATENTED MAR. 27, 1906.

C. VAN C. WHEELER & A. G. McKENNA.

PROJECTILE AND ITS BAND.

APPLICATION FILED AUG. 1, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

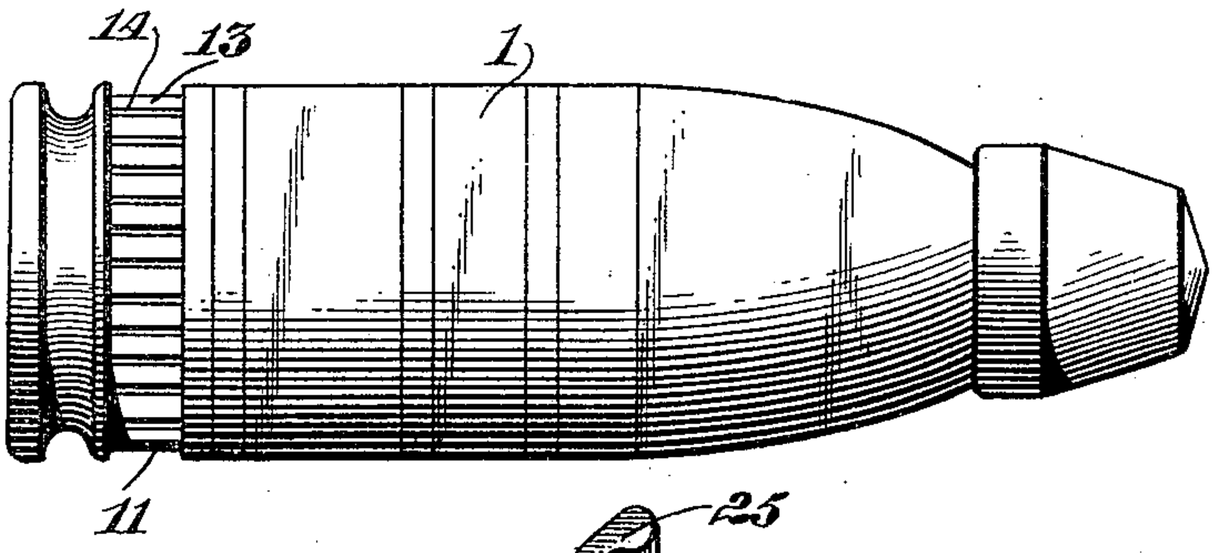


Fig. 2

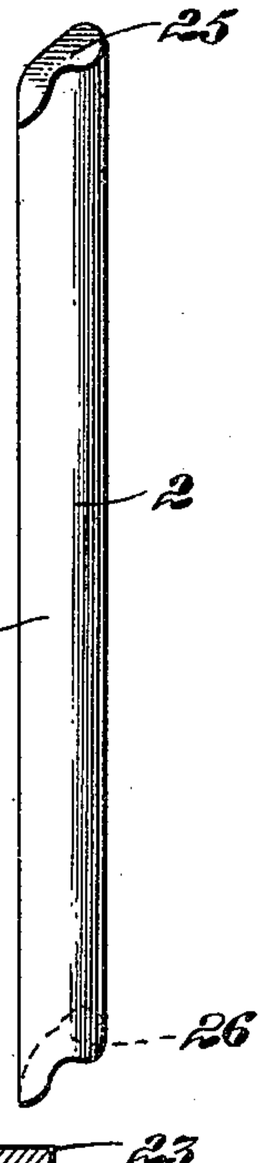
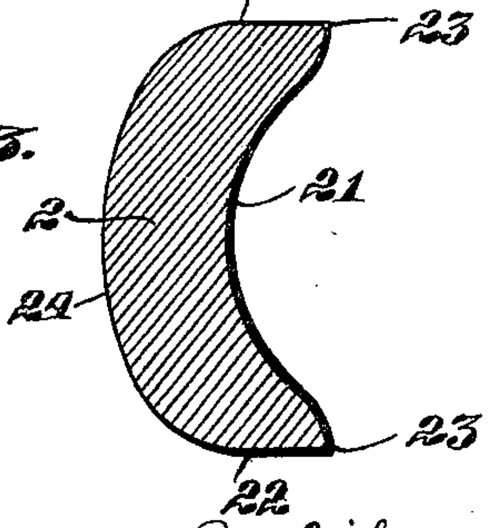


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

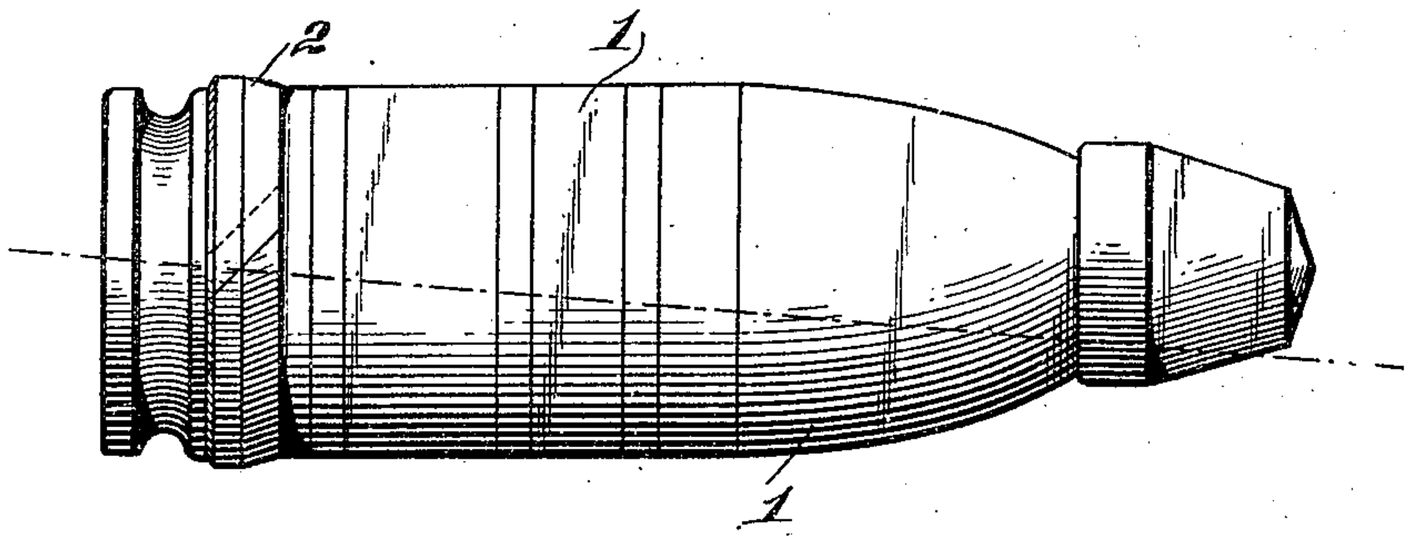
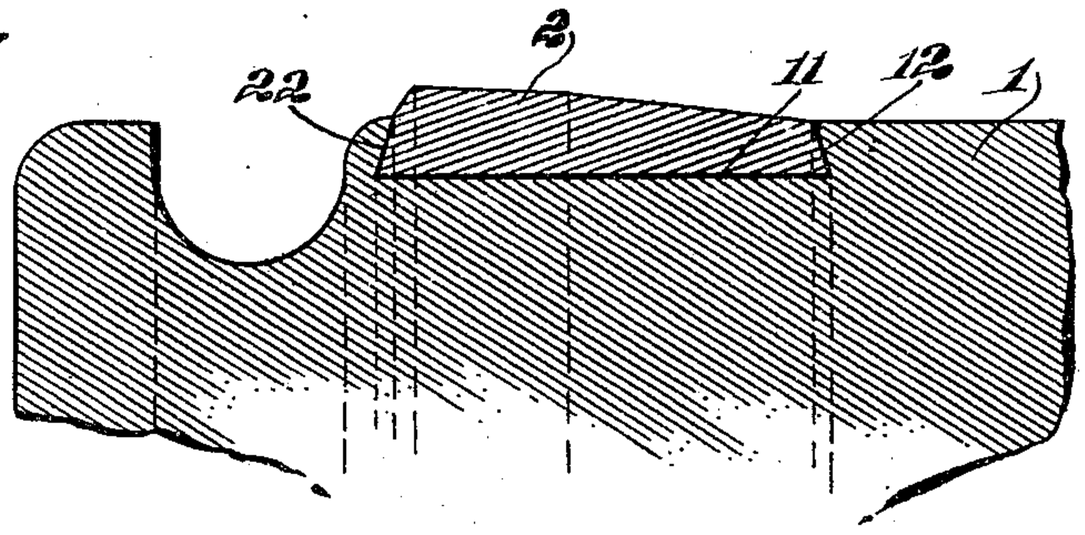


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES VAN CISE WHEELER AND ALEXANDER GEORGE McKENNA, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO FIRTH STERLING STEEL COMPANY, A CORPORATION OF PENNSYLVANIA.

PROJECTILE AND ITS BAND.

No. 815,992. Specification of Letters Patent. Patented March 27, 1906.

Application filed August 1, 1904. Serial No. 219,061.

To all whom it may concern:

Be it known that we, CHARLES VAN CISE WHEELER and ALEXANDER GEORGE McKENNA, citizens of the United States, and residents of the city of Pittsburg, Pennsylvania, (post-office addresses care of Firth-Sterling Steel Company, Demmler, Pennsylvania, engineers,) have invented certain new and useful Improvements in Projectiles and Their Bands, of which the following is a specification accompanied by drawings.

Our invention relates to projectiles. It provides means for securely retaining the rotating bands on projectiles used in rifled ordnance and a novel method of seating such bands in an undercut groove.

Heretofore it has been customary to cut in a shell or the like and preferably near its rear end an annular band-score somewhat undercut and usually crossed by bottom grooves longitudinal of the shell. Into this score a band of copper or other relatively soft metal of rectangular cross-section was forced and peripherally compressed with a view to making it not only fill the undercut of the band-score, but also the bottom grooves therein. As the rotation of the shell in its flight is caused by the engagement of this band with the rifling-grooves of the gun or other piece, it is of the greatest possible importance that the band should be rigidly secured to the shell, so as to prevent the slightest loss of motion therebetween.

The strain of initiating the rotation of a shell weighing several hundred pounds is very great, and a loosened band moving on a shell through the air at a velocity of perhaps three thousand feet per second will destroy its effectiveness. Much trouble of this sort has been experienced in both army and navy practice.

It will be apparent that where it is attempted to apply a band of rectangular cross-section to fill an undercut groove the success of the operation depends entirely upon the flow of the metal. In practice it has so far been unusual to completely fill even a low undercut. With our improvement we find it practicable to at least double the depth of the undercut and to increase both the depth and the number of the longitudinal bottom grooves, and we apply the band of a new initial shape having a wide longitudinal groove or recess on its lower face and preferably a corresponding ridge or swell on its upper face, which remedies all the troubles and defects mentioned above.

To clearly show the invention in its most approved details, we refer to the accompanying drawings, in which—

Figure 1 represents in elevation a shell scored for the application of a band. Fig. 2 represents the band ready for application thereto. Fig. 3 is an enlarged cross-section of the band. Fig. 4 represents the shell complete. Fig. 5 is an enlarged partial sectional view of the shell and band.

1 designates the shell, in which has been cut a band-score 11, having undercut sides 12 and a cylindrical bottom 13, longitudinally grooved at 14.

2 is the band, ordinarily of copper, having a preferably semi-elliptical groove or recess 21 in its lower face, the groove with the vertical side walls 22 of the bar forming shoulders 23. The upper face 24 of the band is shown as outwardly curved, though its form may be varied within the widest limits. The meeting ends 25 26 of the bar or band are formed at a bevel or angle at, say, forty-five degrees, both vertically and horizontally, or rather at such an approximation to that angle as will enable one of them finally to overlap and fit snugly upon the other when in position, as shown in Fig. 4, the plane of juncture being at preferably forty-five degrees both longitudinally and transversely of the shell 1. The width of the bar between the faces 22 22 is of course practically equal to the upper width of the band-score 11.

The bar 2 is placed in the score 11 with its ends overlapped, and powerful peripheral compression is then applied to the outer curved face 24 of the now annular band, which has the effect of deforming the grooves 21 to a straight line against the bottom of the score 11, the side faces 22 of the band being spread outward to fill the undercut of the score. In the compression or in the hammering subsequently given the band the metal is forced

deeply into the grooves 14 of the score. When the compression is finished, the ends 25 26 are firmly abutted against each other, and the band-score is completely filled by the copper band. It is obvious that the cross-section of the bar 2 was at first sufficiently greater than that of the score 11, including its grooves, to permit the turning off of its outer face to a finish, as shown in Fig. 4.

We have usually made the contour width of the transversely-curved lower face of the bar equal to the bottom width of the band-score and the transverse outcurve of the upper face of the bar corresponding approximately to such curve of the lower face. In this case the bar under compression straightens out transversely like the arms of a toggle-joint, so that the actual flow of the metal required to fill the score is reduced to a minimum, the work being nearly all accomplished by such transverse straightening movement of the mass. When the curved width of the lower face of the bar is slightly greater or slightly less than the bottom width of the score, a somewhat greater flow or molecular disturbance will result; but in no case will it be comparable to the flow required where a rectangular bar is used.

It will be noted that the plane of juncture of the abutting ends of the finished band crosses the line of the rifling grooves of the gun at a large angle, the line of one groove being indicated by the broken line *x x*, Fig. 4, and that the direction of the angle and of the overlap is such that the force exerted by the rifling will tend to hold the band still more securely in the band-score. This is in practice of the highest importance, as the lifting up of one or both ends of the band when the ends have been simply abutted against each other forms a sort of lateral fin, which deflects the shell in flight and causes what is known as "tumbling." This is sometimes indicated by a peculiar musical note heard during the flight of the shell.

Without limiting ourselves to the particular construction shown and described, what we claim is—

1. A bar adapted to form a band for a rifle-projectile having an undercut band-score, said bar having its lower face formed with a single transverse curve or concavity extending approximately across its entire surface, and a cross-section not less than that of said score.

2. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having a transversely-incurved lower face, the contour width of which is approximately equal to that of the bottom of said score.

3. A bar adapted to form a band for a rifle-projectile having an undercut band-score, said bar having its lower face formed with a single transverse curve or concavity extending approximately across its entire surface, its outer face having a corresponding single outcurve or convexity, and a cross-section not less than that of said score.

4. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having a transversely-incurved lower face, the contour width of which is approximately equal to that of the bottom of said score, a correspondingly-outcurved upper face and a cross-section not less than that of said score.

5. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having its lower face transversely curved substantially throughout its entire surface, parallel side faces and a cross-section not less than that of said score.

6. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having a transversely-incurved lower face, the contour width of which is approximately equal to that of the bottom of said score, parallel side faces and a cross-section not less than that of said score.

7. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having its lower face transversely curved substantially throughout its entire surface and beveled overlapping ends.

8. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having a transversely-incurved lower face, the contour width of which is approximately equal to that of the bottom of said score and beveled overlapping ends.

9. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having its lower face transversely curved substantially throughout its entire surface and meeting ends cut at an angle both vertical and horizontal with its transverse plane.

10. A bar, adapted to form a band for a rifle-projectile having an undercut band-score, said bar having a transversely-incurved lower face, the contour width of which is approximately equal to that of the bottom of said score and meeting ends cut at an angle both vertical and horizontal with its transverse plane.

11. A rotating band for a projectile adapted for use in rifled ordnance having its ends meeting at an angle with the axis of a projectile and with the rifling-groove of the gun.

12. A rifle-projectile having a band-score and band therein, said band having overlapped ends, the overlap being in the direction of rotation.

13. A rifle-projectile, having a band-score and band therein, said band having over-

lapped ends, the overlap being along a line or plane that is greatly oblique to the line of rifling.

14. A rifle-projectile having a band-score and band therein, said band having overlapped ends, the overlap being along a line or plane greatly oblique to the line of rifling and also being in the direction of rotation.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

CHARLES VAN CISE WHEELER.
ALEXANDER GEORGE McKENNA.

Witnesses:
SAMUEL F. O'LEARY,
FRANK G. HARRISON.