T. A. BOWERS.

TUBULAR PROJECTILE.

APPLICATION FILED APR. 14, 1917.

1,292,388.

Patented Jan. 21, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

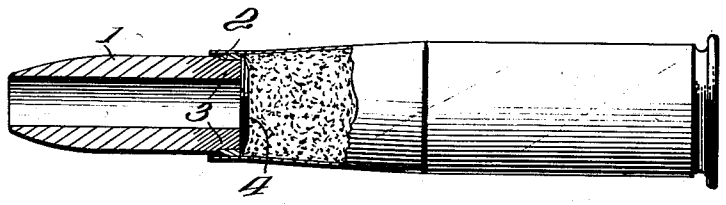


Fig. 2.

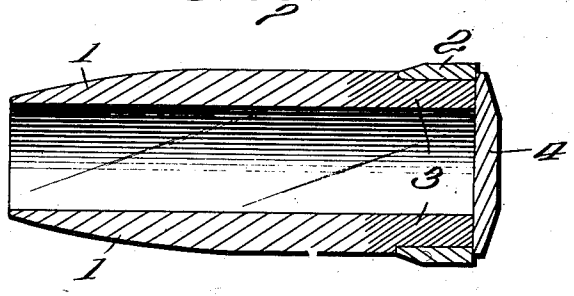


Fig. 3.

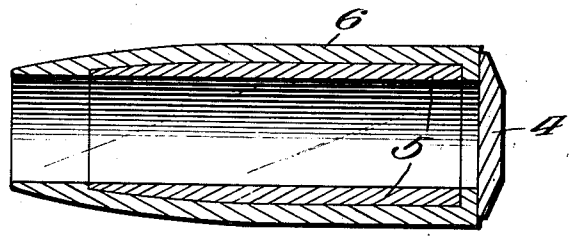
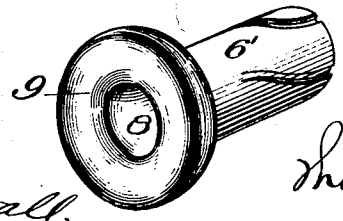


Fig. 7.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

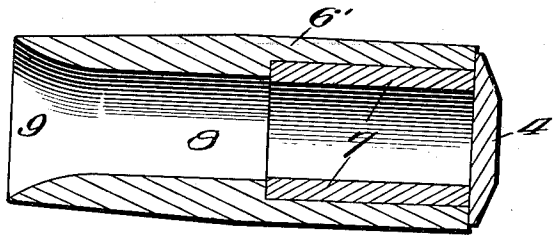


Fig. 5.

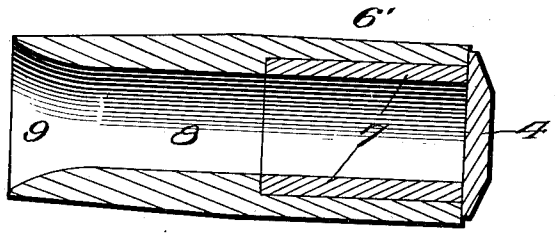
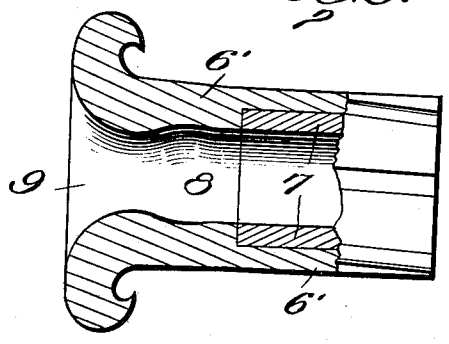


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

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TUBULAR PROJECTILE.

1,292,388. Specification of Letters Patent. Patented Jan. 21, 1919.

Application filed April 14, 1917. Serial No. 161,991.

To all whom it may concern:

Be it known that I, THOMAS A. BOWERS, a citizen of the United States, residing at Auburn, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Tubular Projectiles, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in tubular projectiles, and its primary object is to so construct the projectile that an absolutely gas-tight closure is made between the outer surface of the projectile and the bore of the barrel, whereby any leakage of the gases around the projectile is prevented and the full efficiency of the expanding gases is obtained, and the projectile given a steady and accurate flight.

It has been well-known for years to those skilled in this art, that tubular projectiles theoretically have advantages over the solid projectile, in that it is a lighter body and is thereby forced with greater velocity through the gun with the same amount of pressure, and that there is a material reduction in the air pressure or resistance to the projectile after it leaves the bore of the gun. However, there are certain difficulties arising in the use of tubular projectiles, and certain defects in them, as heretofore known, that have not been overcome, and have proved so serious that tubular projectiles have not been adopted and have not come into use.

Tubular projectiles, as heretofore made would not obtain the theoretical advantages heretofore stated, viz., they would not obtain the theoretical increase of velocity within the barrel of the gun; they would not fly steady and straight when they left the barrel of the gun, but to the contrary, would have a tendency to wabble, and, in some instances, "keyhole," thereby failing to obtain the theoretical reduction of air resistance in their flight.

I have discovered that the failure and defects of the tubular projectiles as heretofore constructed and known are due to the fact that in forcing the projectile through the rifled bore of the gun, the bands of the rifling compress the projectile, thus making it of smaller diameter than the greatest diameter of the bore, thereby causing an irregular cutting of the rifling on the surface of the projectile, which defeats the making of a gas-tight fit between the projectile and the rifled bore of the gun, and the irregular rifling throws the projectile from the muzzle of the gun in such a way as to throw it out of a straight line and causes it to wabble.

I have overcome these defects of the tubular projectile, and have obtained all of its theoretical advantages, by providing a tubular projectile with an incompressible interior or core-portion, whereby the relatively soft rotating surface or band is caused to completely fill the rifling of the bore of the gun and the projectile prevented from being compressed, thereby maintaining its original diameter and fitting the bore of the gun as designed, thus causing the projectile to leave the muzzle of the gun in an absolutely straight line, and preventing absolutely any wabbling of the projectile, and obtaining a remarkable and unusual accuracy in its flight.

This improved projectile with the same pressure behind it, as the ordinary solid projectile, in actual practice, the muzzle velocity is increased and a decreased air resistance resulting in a much more flat trajectory than with a solid projectile.

My improvement may be carried out by variations in detail of construction, but in order to embody my improvement, the tubular projectile must have an incompressible inner portion or body, with the relatively soft outer coating or surface of a thickness at least equal to the depth of the rifling of the gun, and these features overcome all of the defects of the tubular projectile as heretofore known.

In the accompanying drawings—

Figure 1 is a side elevation of a cartridge, with my tubular projecetile in longitudinal section.

Fig. 2 is an enlarged longitudinal sectional view of the projectile shown in Fig. 1.

Figs. 3, 4 and 5 show modified forms of my invention, and illustrate some of the variations which may be made without departing from the spirit and scope of the invention.

Fig. 6 is an enlarged sectional view of the projectile shown in Fig. 5 after it has

been fired, and illustrating the manner in which it mushrooms.

Fig. 7 is a perspective view of a mushroomed projectile after it has been fired.

Referring now to the preferred form of my improved tubular projectile, shown in Figs. 1 and 2, I provide a tubular body portion 1, which extends the whole length of the projectile. In this preferred form the body portion 1 is made of steel, and at its rear end is provided with a ring or band of relatively softer metal 2, adapted to take the rifling of the gun, and projects from the body portion 1 a sufficient distance to be equal to the depth of the grooves of the gun rifling, so that when the projectile is fired the ring 2 completely fills the rifling of the gun and makes a gas-tight fit therewith, and also causes the projectile to rotate in a manner well-known, and the ring 2 may be aptly termed a rotating ring.

In this preferred form of my improvement, only the rear end of the body portion 1 is made incompressible, and this may be accomplished in any well-known manner for instance, one way being the tempering of the rear end of the body portion 1 to a glass hardness, which makes that portion of the body-portion 1, that is surrounded by the rotating ring 2, practically incompressible.

A gas check 3 in the form of a disk is placed at the rear open end of the projectile and temporarily connected therewith by a small quantity of soft solder. When the projectile is fired, the soft solder is melted and the gas-check 3 begins to fall from the projectile as soon as it leaves the muzzle of the gun.

The portion 1 is made preferably of high carbon steel, and it is made incompressible by hardening it to a glass hardness at its rear end in the preferred form, thus making it absolutely incompressible.

I have found in actual practice that by making that portion of the body incompressible where it is surrounded by the rotating member, it takes the rifling of the gun and obtains all the theoretical advantages and overcomes all the practical defects of tubular projectiles, as heretofore known. By actual tests, it has been found that my improved tubular projectile has a substantially flat trajectory for a thousand yards as compared with a substantially flat trajectory of five hundred yards for a solid projectile when fired from an ordinary small fire-arm, and it is also found that my improved tubular projectile is extremely accurate and steady in its flight.

In Fig. 3, the incompressible center or body portion 5 is separate from the outer or tubular jacket 6, of relatively soft metal which is adapted to take the rifling of the gun, and the incompressible center or core portion 5 extends throughout that portion of the jacket which will engage the rifling of the gun and cause the compressing of the tubular projectile unless it has an absolutely positive support.

In Fig. 4, I show an incompressible center 7, which has a surrounding jacket 6, like that of Fig. 3, but the incompressible core or center 7 is shorter than that shown in Fig. 3.

Attention is directed to Figs. 4 and 5. In Fig. 4, it will be observed that the bore of the incompressible center 7 is smaller than the bore 8 of the jacket 6. In this particular form it is made in that way so that when the jacket is upset by the force of the explosion, it contracts and its bore then is the same size as the bore of the incompressible member 7, as shown in Fig. 5.

Figs. 4, 5, 6 and 7 show a mushrooming form of projectile particularly adapted to game. In this form of projectile the forward end of the bore 8 is tapered outward or bell-shaped, as shown at 9.

By reason of this outwardly flared end of the projectile when it strikes an object, its end is flared outward and flared backward until the turned back forward edge rests upon the outer surface of the projectile which so reinforces it, that it cannot roll any further, and it makes a perfect mushroom of the forward end of the projectile. Other mushrooming projectiles expand or smash in in an irregular manner and often break into small pieces, thus minimizing their effect. This one, however, by means of its construction, expands outwardly and back in a regular and even manner until it reaches the form shown in Figs. 6 and 7, when there is no further opening possible as its forward end is reinforced by reason of its shape. This projectile begins to expand upon its first impact with flesh and continues to do so until it reaches the form shown in Figs. 6 and 7. The surrounding jacket in the mushrooming form is preferably composed of malleable material such, for instance, as copper, or other material which is capable of being rolled outward and back without breaking, substantially as shown in Figs. 6 and 7.

In order to carry out my improvement, it is not necessary that the incompressible center or body portion be limited to the zone of the rotating jacket or ring, for it can be incompressible throughout its complete length without departing from the present invention.

I do not wish to be understood as limiting my invention to any of the particular forms here shown, since the broad idea of a tubular projectile having a surrounding rotating ring or jacket and an incompressible center or supporting core will embody my improvement whether or not they be of any of the specific forms herein disclosed. These

forms here shown are mechanical expressions of the broad inventive features herein disclosed and claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An improved tubular projectile having an outer surface of relatively soft metal to take the rifling of the gun, and a practically incompressible tubular core or body portion supporting the projectile against compression by the action of the rifling on the relatively soft surrounding metal.

2. An improved tubular projectile comprising a core or body portion hardened to practical incompressibility, and a surrounding relatively soft metal of a thickness not less than the depth of the rifling of the gun, whereby the projectile is prevented from compressing by the rifle action and a gas-tight fit accomplished for the purposes herein set forth.

3. An improved tubular projectile comprising a body portion extending throughout the length of the projectile and surrounded with a relatively soft metal to take the rifling of the gun, the body portion hardened to practical incompressibility at that portion thereof supporting the soft metal where the latter takes the rifling of the gun.

4. An improved tubular projectile comprising a body portion hardened to brittleness and thereby practical incompressibility and extending throughout the length of the projectile and a relatively soft metal surrounding the incompressible body-portion for the purpose described.

5. An improved tubular projectile comprising a brittle practically incompressible body portion extending throughout the length of the projectile, said body portion having its outer surface completely coated with a relatively soft metal for taking the rifling of the gun.

6. An improved tubular projectile, comprising a body portion hardened to practically incompressibility and extending throughout the length of the projectile, and a coating completely surrounding the outer surface of the projectile and of a thickness sufficient to fill the grooves of the rifling of the gun.

7. An improved tubular projectile comprising an incompressible tubular body-portion extending throughout the length of the projectile, and a surrounding coating of relatively soft material having its engaging surface alloyed with the surface of the body portion and built up thereon to a thickness sufficient to fill the grooves of the rifling of the barrel of the gun.

8. An improved tubular projectile having an incompressible core and a surrounding jacket of relatively soft metal having its forward end tapered outwardly in bell-like form whereby the force of the impact with the object rolls the tapered end backward and outward into an even roll.

9. An improved tubular projectile comprising an incompressible core at its rear portion and provided with a surrounding jacket of a relatively soft material projecting beyond the incompressible core, the forward end of the jacket tapered outwardly in bell-like form whereby the force of impact with an object rolls the tapered end outwardly and backward into a substantially even roll.

10. An improved tubular projectile comprising an incompressible core having a surrounding jacket of malleable material having its forward end projecting beyond the incompressible core and tapered outwardly in bell-like form, whereby the force of impact with an object rolls the tapered end outward and backward into substantially an even and regular roll.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

THOMAS A. BOWERS.

Witnesses:

JENNIE F. LEAHY,

JOSEPH McMANUS.