To all whom it may concern:

Be it known that I, DENSON H. ARMSTRONG, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented new and useful Improvements in Projectiles and Processes of Making the Same, of which the following is a specification.

This invention relates to an improvement in projectiles, more especially adapted for small arms using high explosives, and of that type wherein the body of the projectile is of soft metal and carries an external jacket consisting of a strand of wire sheathed with threads of cotton or other suitable material and wound spirally, the jacket forming a vehicle for a lubricant; and to an improved method of making the same.

The broad or general type of projectile above referred to is well known and is disclosed in the patent to Lisle No. 622,772 of April 11, 1899; and inasmuch as projectiles of this type have been in common use for a number of years, their radical advantages are well known and appreciated and need not be discussed in this specification.

The principal objects of the present invention are to provide a projectile of the broad type stated and a method of making the same whereby an unusually strong and secure union of the jacket and the projectile body is effected, and the projectiles will uniformly have great penetrating power and a true flight in a flat trajectory, and whereby the manufacture of the projectiles may be carried on more expeditiously, with greatly lessened cost, with practically no loss by reason of bad or defective projectiles and with uniform superiority of the product achieved.

The nature of the invention will be explained at length in the following description, taken in connection with the accompanying drawing, wherein:

Figure 1 is a perspective view of the spirally wound jacket;
Fig. 2 is a longitudinal sectional view of the projectile prior to swaging; and
Fig. 3 is an elevation of the finished projectile.

Similar characters of reference designate corresponding parts throughout the several views.

The jacket 1 consists of a fine strand of wire of suitable ductile metal harder than the body of the projectile, which is sheathed with layers of threads 2 of cotton or other suitable material, the said threads being wound spirally about the wire strand. The strand is then wound spirally into the form of a cylinder whose convolutions are preferably in immediate juxtaposition or in contact with one another and the ends of the strand are extended, as at 3 and 4, in the direction of the longitudinal axis of the cylinder, the extended end 3 being located within the cylinder and the extended end 4 projecting beyond the cylinder.

In making the projectiles the jackets originally constructed as above described are placed within the molds and thereafter the molten metal is poured in the molds whereby the body 5 will be cast within the jacket whose axially extended ends 3 and 4 will be securely anchored or embedded in the said body.

Fig. 2 shows the projectile at the completion of the molding operation and after it has been cut from the sprue. At this point it should be noted that experience has demonstrated that the molten metal does not burn the threads with which the wire strand of the jacket is sheathed and that the projectile may be removed from the mold with much greater facility and safety than is possible in the method heretofore employed in manufacturing projectiles of the type to which the present invention relates. The association of the jacket with the projectile body by casting the latter within the jacket not only establishes an efficient initial union of the jacket and the projectile body but also renders it unnecessary to weaken the body by cutting deep grooves therein in which the ends of the jacket may be secured.

The projectile as taken from the mold is "sub-caliber"; and in this form is placed in a suitable swage and subjected to pressure by a suitable arrangement of plungers whereby the finished projectiles will all be of uniform weight and size, surplus metal will be removed from the point of the bullet slug, and the usual gas check 6 will be applied to the shoulder of the bullet body in the rear of the jacket.

The swaging operation brings the bullet up to the required caliber, shortens its length and increases its diameter. This operation as applied to a bullet in accordance with the present invention changes the form and dimensions of the jacket, shortening the length of the latter, considered as a cylinder, and increasing the diameter and, hence, the
circumference of its convolutions; and by virtue of this change in the form and dimensions of the jacket in connection with the shortening and expansion of that portion of the projectile body which the jacket surrounds, insure a union of the strongest possible character between the jacket and the projectile body.

The ductility of the wire from which the jacket is formed permits of the increase in diameter and circumference of the convolutions as described, the cotton sheathing of the wire permits of the closer association or crowding of the convolutions in consequence of the shortening of the length of the jacket, considered as a cylinder, and the immediate juxtaposition or contact of the convolutions of the jacket provides an uninterrupted surface against which the portion of the projectile body within the jacket bears and by virtue of which the convolutions of the jacket will not cut into said body, or, stated otherwise, the material of said body will not be forced through or between said convolutions.

When the bullet, by virtue of the swaging operation, is brought up to the required caliber, the convolutions of the jacket are under compressive transverse stress, i. e. they have the closest possible association with one another and the jacket will, therefore, have uniform contact throughout its area with the rifling of the gun, thus promoting the cleaning of the gun by the projectile and insuring of the accuracy of the flight of the projectile. Moreover, when the projectile is swaged to the required caliber, the wire in which the jacket is formed is stretched to a certain extent and the convolutions of the jacket are under tensioning circumferential stress, the effect of which is to prevent any flattening or expansion of the projectile body when it strikes the target and, hence, to insure that the projectile shall have great penetrating power and to avoid any substantial loss of metal during its penetration.

I claim—

1. A projectile comprising a jacket and a soft metal body within the jacket, the jacket consisting of a strand of ductile wire sheathed with threads of cotton or like material and wound spirally to form a cylinder whose convolutions contact with one another and are under tensioning circumferential stress and compressive transverse stress and whose ends are extended angularly and embedded within the soft metal body.

2. The method of making a projectile for small arms which consists in coiling a strand of ductile wire into the form of a cylinder whose convolutions are in contact, in casting the soft metal body of the projectile sub-caliber within said cylinder and anchoring and ends of said cylinder in said body, and in thereafter swaging the projectile to bring it up to the required caliber whereby the convolutions of the cylinder are increased in diameter and circumference, are crowded against one another, and bear with increased pressure on the inclosed portion of the soft metal body.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DENSON H. ARMSTRONG.

Witnesses:

H. ERNEST WARREN,
CHARLES W. SAWYER.