UNITED STATES PATENT OFFICE.

BENJAMIN B. HOTCHKISS, OF NEW YORK, N. Y.

IMPROVEMENT IN PROJECTILES FOR RIFLED ORDNANCE.

Specification forming part of Letters Patent No. **182,278**, dated September 19, 1876; application filed March 4, 1876.

To all whom it may concern:

Be it known that I, BENJAMIN B. HOTCHKISS, of New York city, in the State of New York, temporarily residing in Paris, France, have invented certain Improvements in Projectiles for Rifled Ordnance, of which the following is a specification:

The invention relates to the packing and the mode of mounting it on the projectile.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation, partly in section. It represents my projectile with its packing-belt continued uniformly around. It may serve in this condition for breech-loaders; but to adapt it for muzzle-loaders it requires to be differently formed on the periphery either in the first instance or by a subsequent treatment. Fig. 2 represents the projectile after the surface of its packing-belt has been grooved longitudinally and slightly spirally to match approximately to the lands of the gun. Fig. 3 is a central longitudinal section on the line *x x* in Fig. 4. Fig. 4 is a cross-section on the line *y y* in Fig. 3.

I have represented only a solid projectile. It will be understood that the packing-belt and its mounting may be the same on a projectile of different proportions, and variously formed with regard to internal cavities, fuse-apertures, &c.

Fig. 5 indicates means by which the longitudinal grooving for the lands may be produced. Fig. 6 is a section through the projectile and through certain dies which compress the ends of the packing-belt.

Similar letters of reference indicate like parts in all the figures.

A is a body of cast-iron. B is a packing-belt, of soft brass or other suitable material. It can be made by casting or otherwise; but a very desirable material for the packing is a short length of drawn tubing, fitted over the body, and compressed upon the projectile by dies, as shown in Fig. 6. Circumferential relieving-notches are cut or otherwise formed in the surface of the packing-belt B, so proportioned that the ridges *b* by being crushed down by the lands of the gun will fill, or nearly fill, the spaces between the ridges. The front end of the packing-belt is a little smaller than its main portion, so that in effect the taper of the front of the projectile is continued upon the belt, thus diminishing the resistance of the atmosphere. The space on the body A which is to be covered by the belt B is recessed to a depth of, say, half the thickness of the belt. At the front edge it is recessed deeper, as indicated by *a*, and a corresponding recess or groove extends around under the rear edge, as indicated by *a'*. The packing-belt is compressed firmly into these recesses *a a'*. The longitudinal grooving on the exterior of the packing-belt is indicated by *b'*. The width and the inclination of these grooves should correspond nearly to the lands of the gun from which it is to be fired.

When the projectile is to be fired from breech-loading guns, these longitudinal grooves *b'* may be omitted, and the lands of the gun itself will crush down the ridges *b*, and make flat spaces corresponding to *b'*. For use in muzzle-loaders, it is desirable to determine the number of grooves and approximately the width and inclination thereof, and to produce the proper sunk spaces *b'* beforehand.

The apparatus shown in Fig. 5 may be made available for this purpose by employing a die, W, which is correspondingly formed, and forcing the projectile through it by a suitable press, the plunger of which is indicated by V. X is a firm bed, on which the die W rests, with a sufficient hole to allow the projectile to fall through. The same arrangement of parts may be employed with a different die, W—that is to say, without any provisions for forming the longitudinal grooves *b'*—for the purpose of compressing the entire packing-belt into its recess in the body.

Fig. 6 shows differently-formed dies M M'. The upper die M is carried on the plunger of a press, or by other suitable mechanism, so as to be moved forcibly toward the reverse die M' below. Each is countersunk or made conical at *m*, and acts on the edges of the packing to condense and compress it into the recesses *a a'*. The circumferential grooving *b*,

and any additional taper to the front of the belt, may be imparted afterward by turning or otherwise.

The grooves *a a'* at the front and rear edges of the packing-belt allow the use of a thin packing-belt, and yet secure a strong hold of the body. These grooves *a a'* may be uniform and the compression corresponding, or they may be indented after the manner of teeth, to better resist the torsional force at the time of the discharge. The body of the projectile under the packing-belt may be roughened, or any approved means, as tinning and sweating, may be employed to connect the belt to the body very firmly, in addition to the means which I have shown.

I propose to use the invention mainly for breech-loaders, and consequently without the longitudinal grooves *b'*.

I claim as my invention—

1. The grooves *a a'* in the body A, at both the front and rear of the packing, in combination with the packing-belt B, inclosing and locking both its edges therein, as herein specified.

2. The circumferential ridges *b* and longitudinal grooves *b'* on the packing-belt B, in combination with each other and with the body A, and adapted to serve as and for the purposes specified.

In testimony whereof I have hereunto set my hand this 6th day of October, 1874, in the presence of two subscribing witnesses.

B. B. HOTCHKISS.

Witnesses:
WM. C. DEY,
E. VOLKMANN.