B. B. HOTCHKISS.

PROJECTILES.

No. 184,286, Patented Nov. 14, 1876.

Fig: 1.

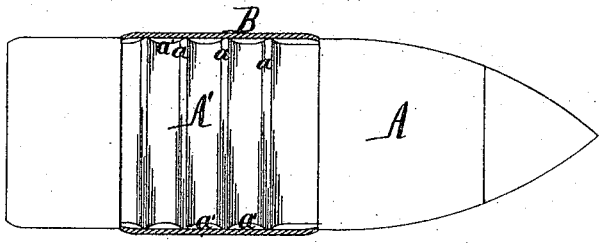


Fig: 2.

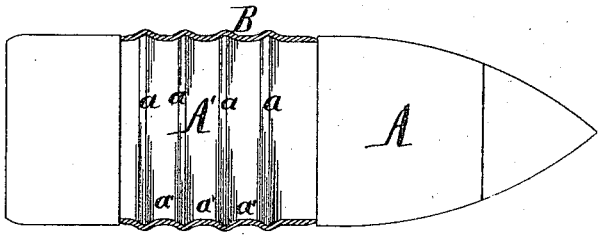
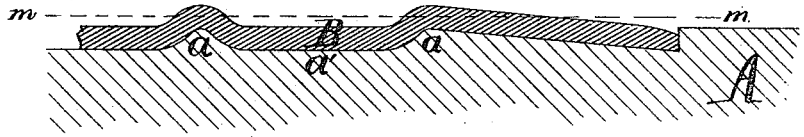


Fig: 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN PROJECTILES.

Specification forming part of Letters Patent No. **184,286**, dated November 14, 1876; application filed September 29, 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 new and useful Improvements relating to Projectiles, of which the following is a specification:

My improvements apply to projectiles for breech-loading rifle-guns, of all sizes, in which there is a belt or packing of softer metal enveloping a body of cast-iron or other different material. In common with other projectiles of this class, I supply a belt or packing of sufficiently large diameter to fill, or about fill, the rifled grooves, and allow the belt to take the impression of the rifling on entering the rifled portion of the piece. This allows projectiles of the right caliber to be used in pieces having various numbers and widths of grooves.

It seems to be necessary to the best working that the belt or packing shall have considerable width, so as to take hold of each land, not merely at a single point in the middle or rear of the projectile, but along a considerable extent of the surface. There are objections to the use of an extremely soft metal for the packing. It is best for general practice in iron guns to use a tolerably hard brass; but the impressing of the grooves of the gun into a broad packing of brass imposes great resistance to the motion and wear on the gun.

I have devised a cheap and ready means of reducing the extent of bearing-surface, while leaving it distributed along a considerable length of 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 an elevation of a projectile with a central longitudinal section of the packing-belt in the condition it is placed in the gun. Fig. 2 represents the same in the condition it assumes in the act of moving forward into the rifled grooves. Fig. 3 is a section of a portion of the same on a larger scale. It shows more plainly the form which I give to the front face of the forward ridge.

Similar letters of reference indicate corresponding parts in both the figures.

A is the body of the projectile, of ordinary cast-iron, which I have represented as equipped with a separate conical point, but which, instead thereof, may have any ordinary or suitable fuse-plug or the like. B is the packing-belt, of good width, and compressed inward at the front and rear edges, by suitable dies, not represented, so as to engage firmly with the shoulders at the front and rear edges of the packing-seat A′. This packing-seat is formed with four or other desired number of rings, *a*, which rings are either cast sufficiently perfect, or are afterwards finished to exactly the diameter desired, to hold the packing belt out to the proper extent to fill the rifled grooves or take a proper hold therein. Between these rings or ridges *a* the packing-seat is more depressed, as indicated by *a′*.

When the gun is discharged, the gases resulting from the combustion of the powder flow forward at an immense pressure in the thin annular space between the projectile and the interior of the gun. Practically, none of this gas gets between the belt and the body of the projectile, but all passes on the exterior of the belt, forcing the packing inward against the body. The brass is thereby compressed inward, and assumes the condition shown in Fig. 2. Thus conditioned, the projectile moves forward into the rifled part of the piece, and the lands of the gun are impressed, not on the entire surface of the packing, but only on the ridges, which extend around in packing over and accurately conforming to the ridges or rings *a*. These rings are distributed so as to afford the proper support to both ends of the projectile.

In case of very long projectiles I propose to divide the packing-belt into two parts, leaving an unpacked space between, or, in other words, to employ two or more packing-belts, one before the other. But in such case, as with a single belt, I form each with the alternate ridges and depressions in the seat for the packing, and apply the packing as a plain ring, allowing it to be molded to the seat in the act of firing, as above described.

My experiments indicate that a very moderate amount of bearing-surface properly distributed is sufficient. About the proportions shown in the figures I believe to be the best.

I esteem it especially important that the foremost ridge shall be gradually tapered from the front, as best shown in Fig. 3. The resistance of the air is materially lessened by making this angle small.

In Fig. 3 the dotted line *m m* indicates the extent to which the packing is impressed in entering the rifled portion of the gun.

It will be observed that all those portions of the packing over the depressions *a* stand within the diameter of the lands, and remain ungrooved.

My invention allows the use of cheaply made and easily applied packings. It may be desirable in some or all cases to turn the ridges *a* and the depressions *a'*; but this may be done at the same time that the general exterior of the projectile is treated, and will increase the labor or cost but little, if at all.

The packing-rings, made as plain cylinders, may be simply pressed inward at the front and rear edges, and no further care is necessary. If preferred, the packing may be pressed into the depressions by dies.

The thin packing-ring B is made to present, by my invention, substantially the same ridged surface on its exterior as a thicker packing, after being elaborately grooved around in a lathe or otherwise; but the expense is much less.

I claim as my invention—

A projectile for rifle pieces, having ridges *a* and depressions *a'* in that portion of the main body A beneath the packing B, in combination with such packing, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 26th day of September, 1876, in the presence of two subscribing witnesses.

B. B. HOTCHKISS.

Witnesses:

THOMAS D. STETSON,

A. HENRY GENTNER.