

(No Model.)

H. EICHBAUM.

DELAYING THE MOVEMENT OF PROJECTILES IN PNEUMATIC GUNS.

No. 433,648.

Patented Aug. 5, 1890.

Fig. 1.

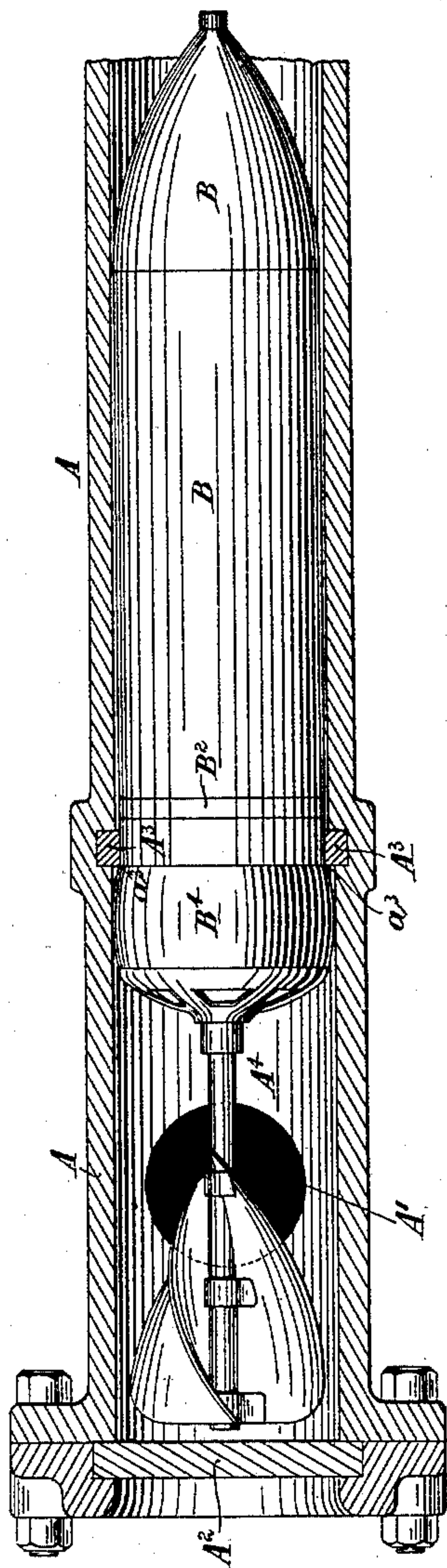


Fig. 2.

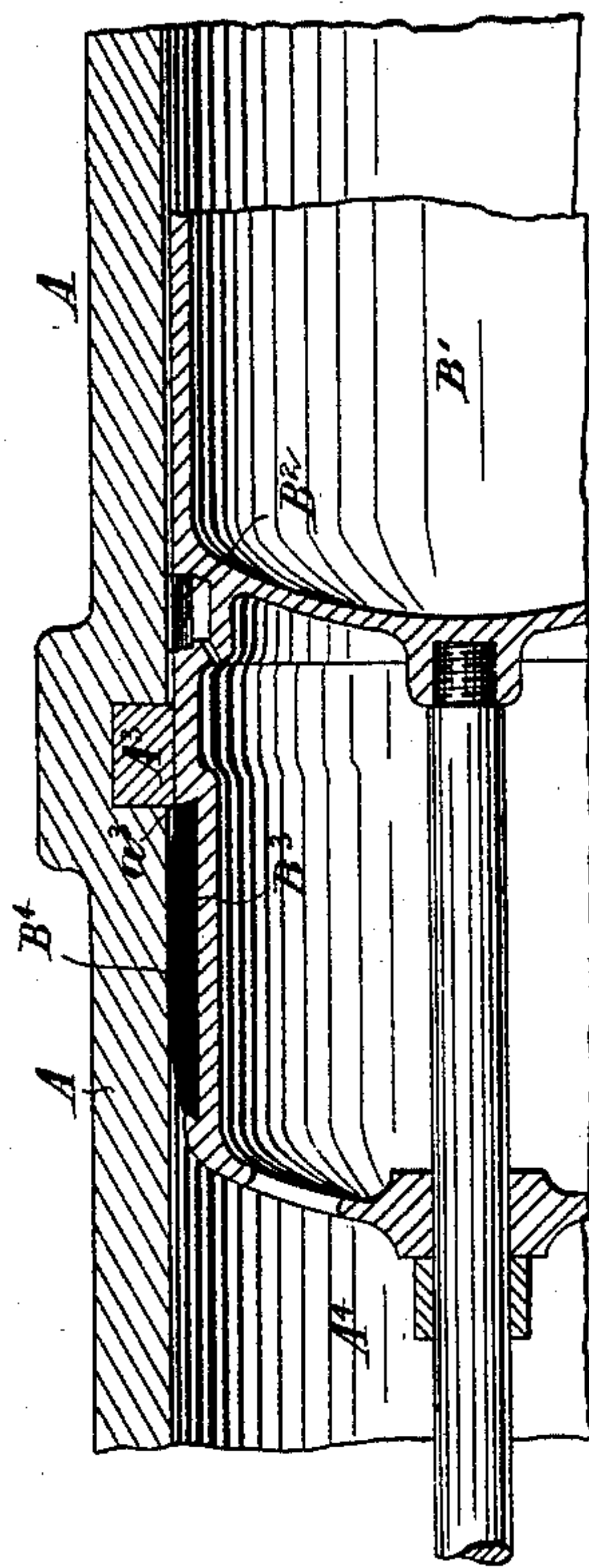


Fig. 3.



Witnesses:

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# UNITED STATES PATENT OFFICE.

HENRY EICHBAUM, OF LONDON, ENGLAND.

DELAYING THE MOVEMENT OF PROJECTILES IN PNEUMATIC GUNS.

SPECIFICATION forming part of Letters Patent No. 433,648, dated August 5, 1890.

Application filed April 16, 1890. Serial No. 348,206. (No model.) Patented in England October 30, 1889, No. 17,180.

*To all whom it may concern:*

Be it known that I, HENRY EICHBAUM, a citizen of the United States, at present residing at London, in England, have invented certain new and useful Improvements in or relating to Means for Delaying the Movement of the Projectile in Pneumatic Guns, (for which I have obtained patent in Great Britain, No. 17,180, dated October 30, 1889,) of which the following is a specification.

The object of this invention is to prevent the projectile in a pneumatic gun from being blown out by the first impulse of air that enters the barrel before the pressure of the air has accumulated in sufficient force to act efficiently to propel the projectile, and thus to secure a greater range without increasing the air-pressure to a dangerous degree. As the projectiles of pneumatic guns are generally intended to be charged with high explosives, it is important in thus delaying the start of the projectile to so arrange the means by which it is accomplished that there shall be as little shock as possible both in the start of the projectile from a state of rest and in its release from the force that resists its movement. The manner in which such delay and gradual start of the projectile is provided for in this invention is shown in the drawings accompanying this specification, in which—

Figure 1 represents a longitudinal section of the breech end of a pneumatic gun with the breech closed and a projectile in external view ready to be discharged. Fig. 2 represents a longitudinal section, on a larger scale, of those parts of the barrel and projectile in which the device is located. Fig. 3 shows a modification of part of Fig. 2.

The same letters refer to the same parts in all the figures.

A is the gun barrel or tube, A' being an opening through which air is admitted to impel the projectile, and A<sup>2</sup> the breech-block.

B is the projectile, B' being the chamber containing the explosive, and B<sup>2</sup> a gas-check to prevent the impelling air passing by the projectile in the barrel. Behind the gas-check the shell of the projectile is extended to allow of a wide dovetailed recess B<sup>3</sup> being formed in its circumference, and this recess is filled with a ring B<sup>4</sup>, of soft metal—such as pewter, type-metal, lead, or any other suitable mate-

rial—of somewhat larger diameter than the rest of the projectile. A uniform diameter of this ring slightly larger than the bore of the gun, as shown in Fig. 3, may in some cases be sufficient to delay the projectile to the desired extent without shock either at the start or release; but it is shown in Figs. 1 and 2 of such external shape that while at each edge of the recess B<sup>3</sup> it is the same diameter as the shell of the projectile it is swelled in the middle to a larger diameter, from which it tapers to either edge. To accommodate this increased diameter of the projectile at this point, the barrel at the breech is formed with a chamber A<sup>4</sup> of a diameter sufficiently large to allow the insertion of the projectile, as shown in the drawings.

It is evident that as thus made the projectile cannot be discharged from the gun without the removal of all that part of the soft-metal ring which projects beyond the diameter of the barrel along which it has to travel to reach the muzzle. The ring therefore offers a definite resistance to the movement of the projectile, which will allow the air-pressure to accumulate to any desired amount, dependent chiefly upon the diameter and shape of the ring, the quality of the metal, and the shape and condition of the edge which strips it. To remove the projecting metal of this ring so that the projectile may be discharged, I place in a suitable position in the gun-barrel a cutting or stripping ring, preferably of steel and of the same internal diameter as the bore of the gun, or slightly smaller, which acts as a cutter or scraper to strip off the soft metal as the pressure of the air forces the projectile forward. This ring is shown at A<sup>3</sup>, Figs. 1 and 2. It may be made in sections, so as to be placed from the inside in the recess, in which it is shown, or it may be made in one piece and the barrel so constructed as to allow of its insertion or removal. In either case it is desirable that it should be hardened and tempered and its scraping or cutting edge a<sup>3</sup> kept in uniform condition, as also the rings B<sup>4</sup> of the projectiles, so that the amount of resistance should be the same with all projectiles.

In the drawings the steel ring is shown as just on the point of cutting the soft metal;



but, if desired, a short run may be allowed the projectile before the steel engages the soft metal.

As shown in the drawings in Figs. 1 and 2, it is evident that the projectile would move slightly at the first impulse of the air, and that as it advanced the increase of the amount of soft metal to be removed would oppose more and more resistance to the movement of the projectile. This would be met by the accumulation of the air-pressure, which would at last overcome the resistance offered at the greatest diameter of the soft-metal ring. To provide against a shock by the sudden cessation of the resistance, the soft-metal ring is tapered off at the rear edge, as already described, and when this has passed the steel ring the projectile is free to traverse the gun-tube.

It will be perceived that considerable variations may be made in the details of this invention without departing from the spirit of it. For example, the shape, size, position, or general arrangement of the ring B<sup>4</sup> and the place or manner of connecting it to the projectile, or a number of rings, interchangeable or otherwise, in a number of segments might be used and similarly with the ring A<sup>3</sup>, for which many equivalents might be devised. The placing of the soft metal in the gun and the stripping-edge upon the projectile would for many reasons be so undesirable that it is unnecessary to dwell upon the numerous modifications which could be devised upon those lines.

The term "soft metal" is applied to the ring B<sup>4</sup> in this specification; but it will be understood that other materials—such, for example, as a suitable cement—might be used in place of metal, and the term "soft metal" is intended to embrace such other materials.

Merely to compare the purpose of the soft-metal sabot of the ordinary shell with the purpose of the soft-metal ring of the present in-

vention will suffice to establish their entire dissimilarity both of purpose and of operation. The ordinary sabot is designed to expand into the rifling-grooves of the gun, with which it then intercalates, acting as the male element of the rifling, but is not intended to have any retarding effect upon the projectile. The soft-metal ring of the present invention is, so far as any extension beyond the diameter of the projectile is concerned, entirely removed before it enters the gun-tube proper. It is not intended to enter at all into the rifling-grooves (if any) of the gun, and its special purpose is to retard the start of the projectile until the predetermined pressure has been attained.

I claim—

1. The within-described method of retarding or delaying the movement of the projectile in a pneumatic-gun barrel or tube, which consists in the removal of a portion of soft-metal obstruction upon the projectile as it moves forward in the gun-barrel under pressure of the propelling-fluid, substantially in the manner described.

2. As a means for retarding or delaying the movement of the projectile in a pneumatic-gun barrel or tube, a soft-metal obstruction upon the projectile and a cutting or stripping edge upon the gun, substantially as described.

3. As a means for retarding or delaying the movement of a projectile in a pneumatic-gun barrel or tube, a soft-metal ring surrounding the projectile and extending beyond the surface thereof and a cutting or stripping ring arranged within the barrel or tube, substantially as and for the purpose set forth.

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

HENRY EICHBAUM.

Witnesses:

HARRY B. BRIDGE,  
HAROLD WADE.