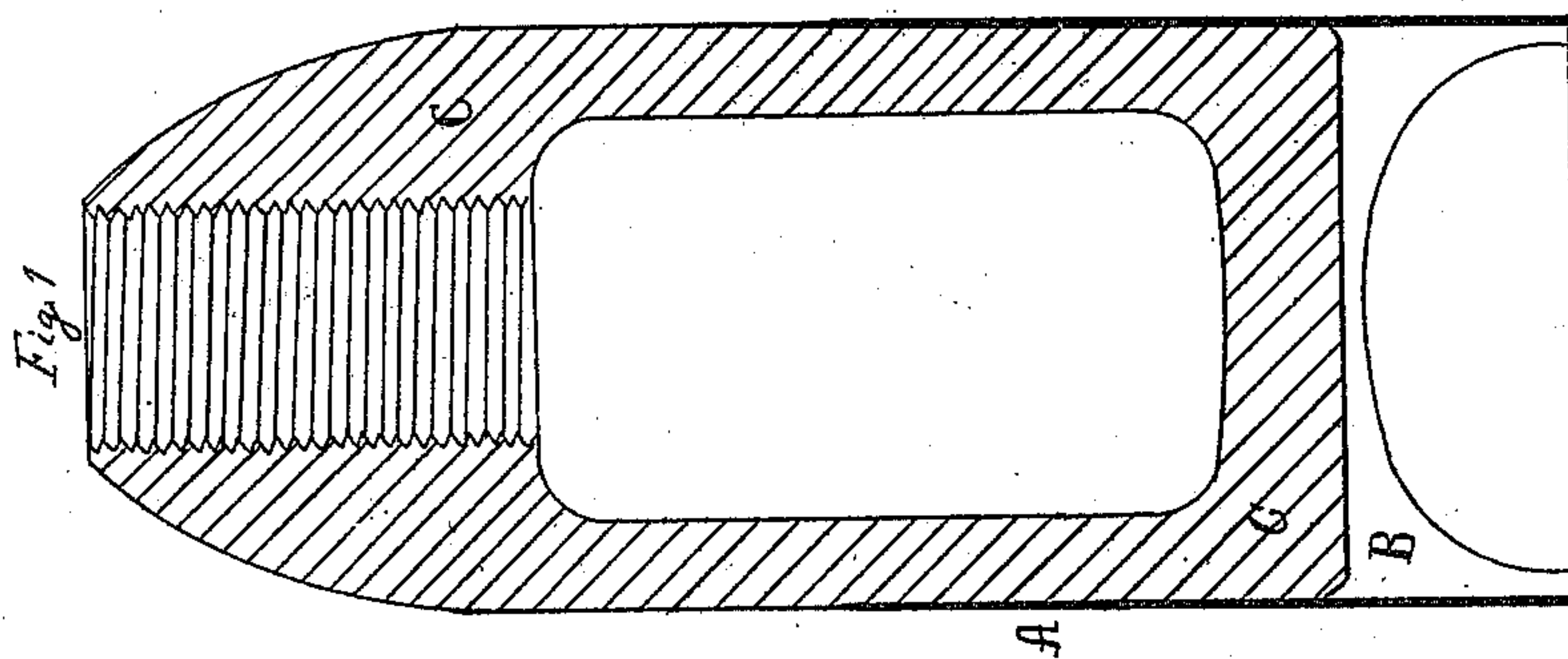
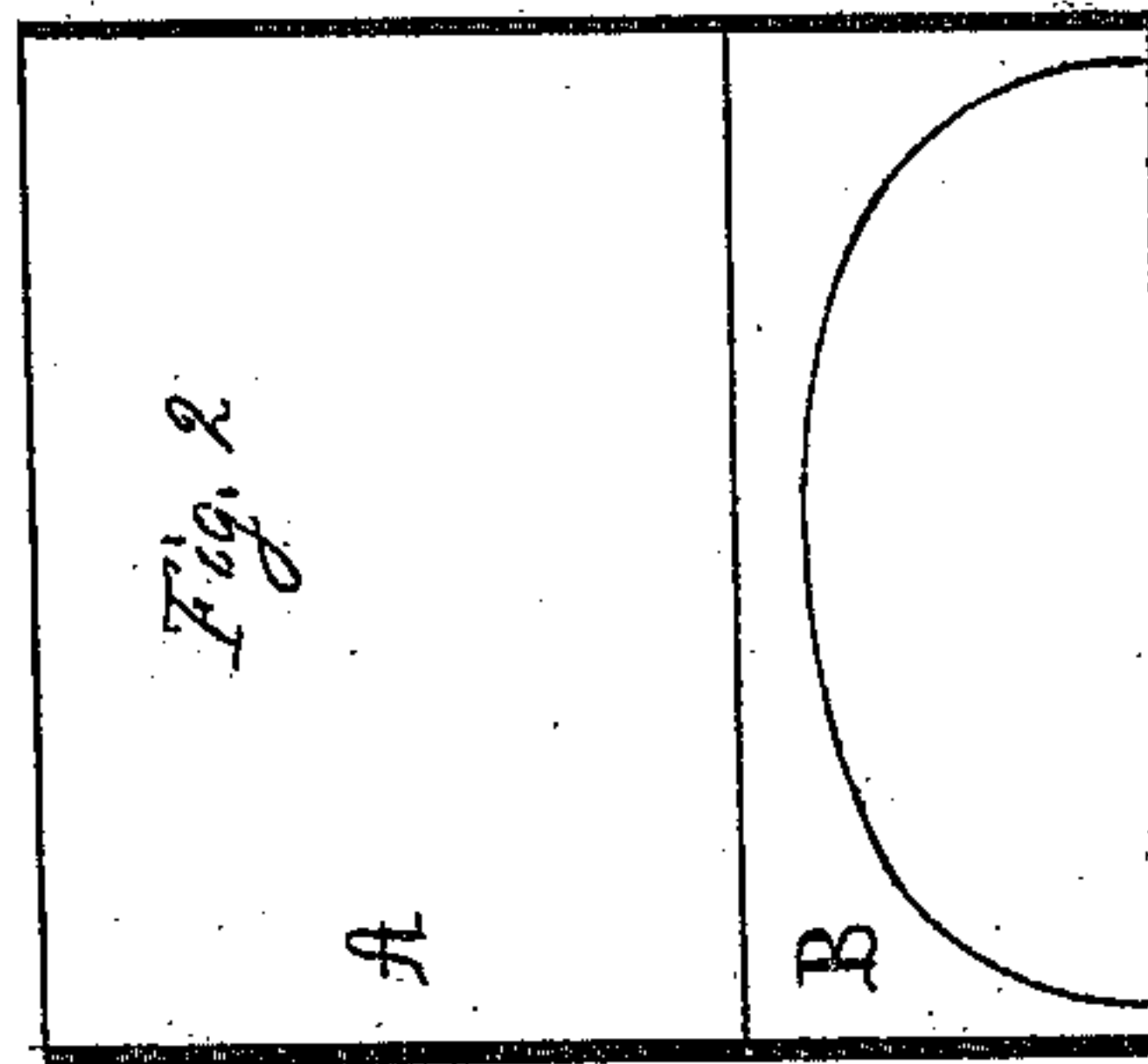
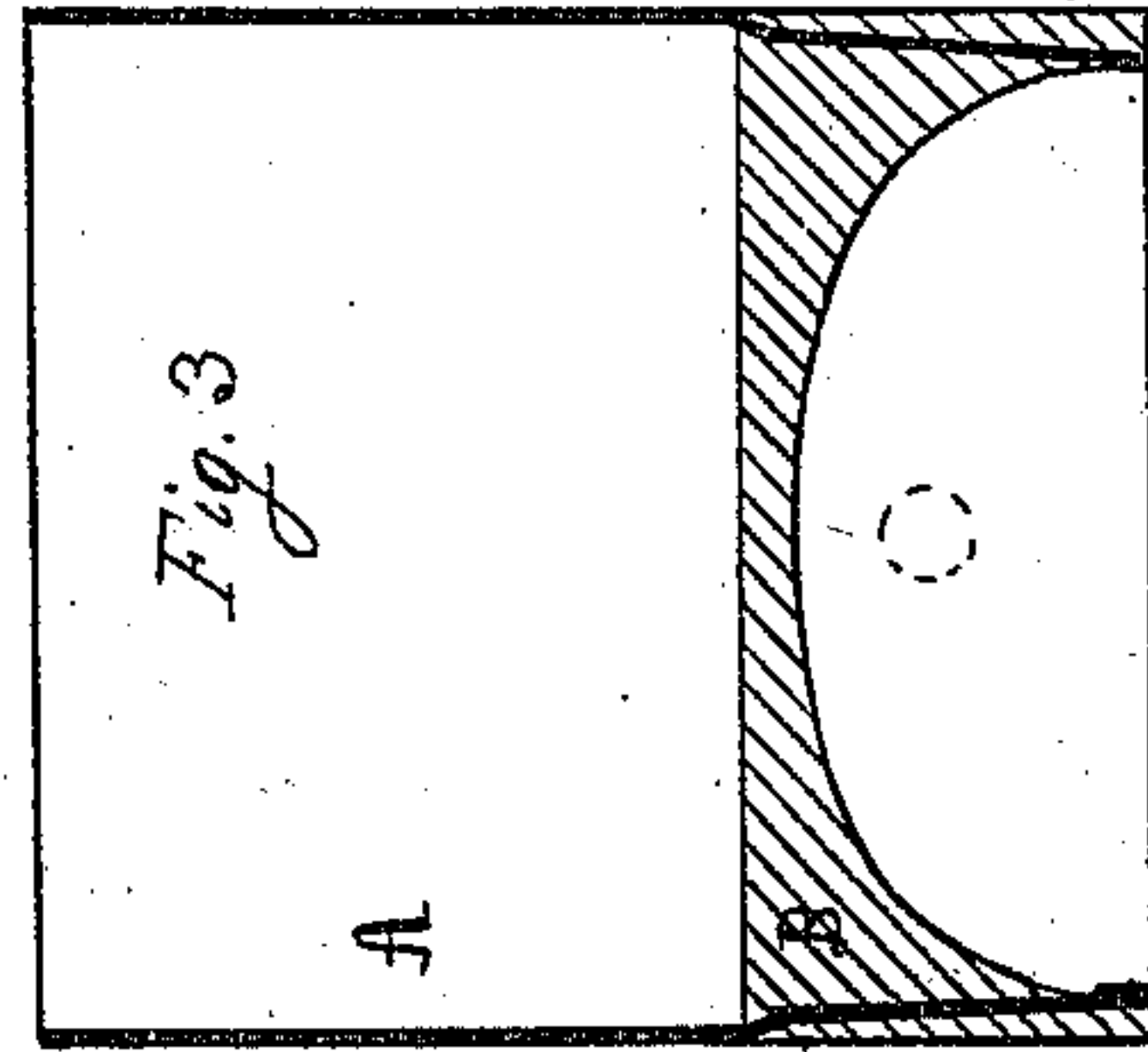
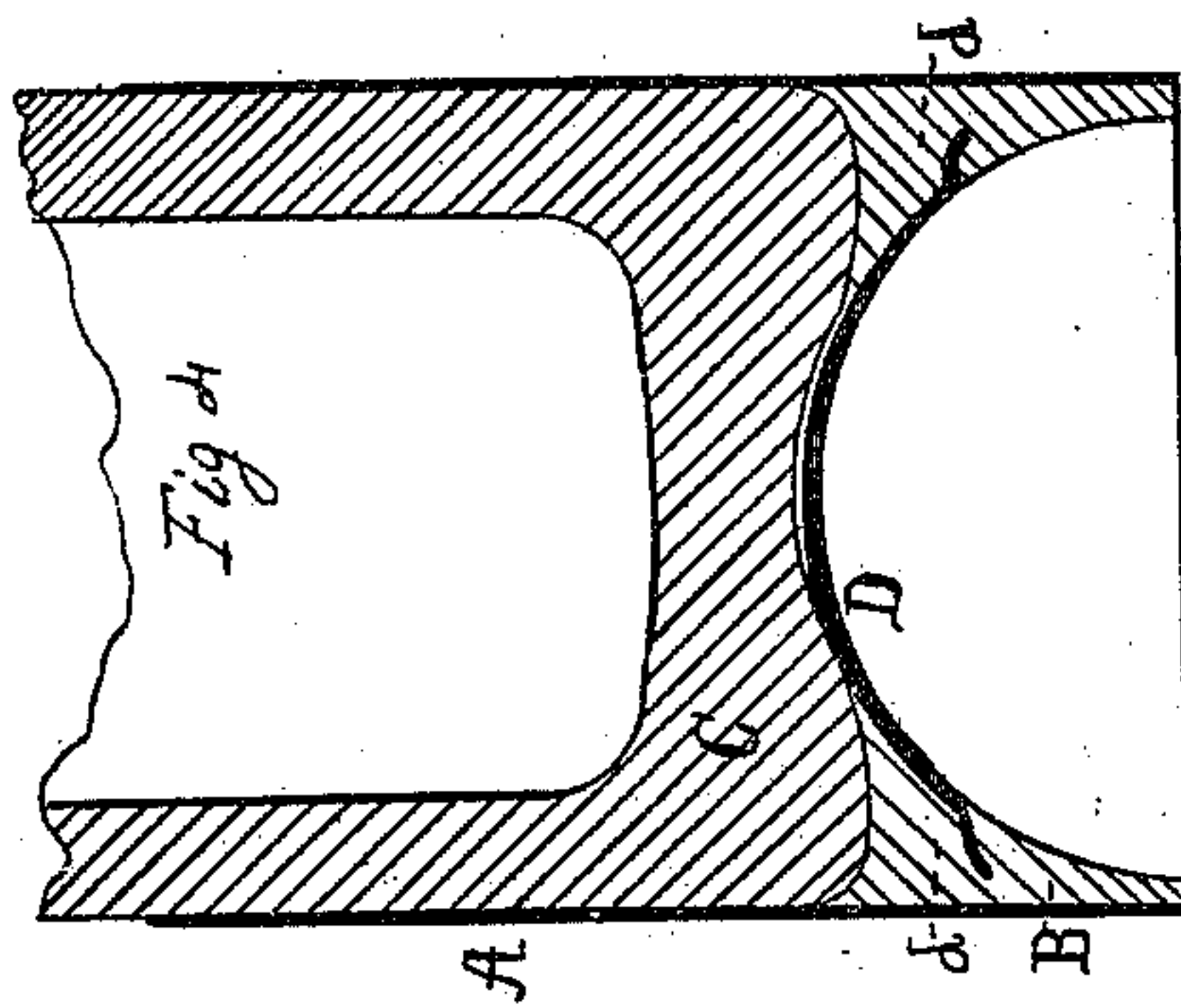


W. BOEKEL.
Projectile.

No. 42,268.

Patented April 12, 1864.



Witnesses
Louis Zennegg
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PACKING PROJECTILES FOR RIFLED ORDNANCE.

Specification forming part of Letters Patent No. 42,268, dated April 12, 1864.

To all whom it may concern:

Be it known that I, WILLIAM BOEKEL, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Projectiles for Rifled Ordnance; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, and to the figures and letters of reference marked thereon.

The object of my invention is to provide a better means than has heretofore been devised for the attachment of soft-metal packing to elongated projectiles, whereby a perfect union of the cast-iron body with the packing shall be obtained, and which shall insure the most accurate transmission of rotary motion to the body of the projectile by the expanding packing, while at the same time it will guard against all liability to separation of particles of the soft metal from the iron during its flight.

My present invention is simply a modification of and an improvement upon the method of applying soft-metal packing to projectiles for which Letters Patent were granted to me September 16, 1862, the nature of my improvement consisting, first, in the employment of an expansible band of sheet-brass, or of any other tenacious composition or metal, which, first being thoroughly embodied with the soft packing metal at its rear end, is then forced or drawn upon the iron body of the projectile by the application of a draw-plate, in substantially the same manner as described in the above-mentioned patent of September 16, 1862, and as hereinafter fully explained.

Another feature of my invention is most important in the application of soft-metal packing to projectiles of large caliber, as it obviates the heretofore existing difficulty of preventing the explosion of the charge from stripping the packing from the projectile, and also permits a great reduction of the weight of soft metal employed for the purpose.

It consists in the employment of a strong cup of heavy sheet-iron or other metal, so shaped as to form the inner portion of the expanding-chamber in the back end of the projectile. A band of packing metal is cast upon this cup, the two being well soldered and otherwise united (as hereinafter fully described.)

A central portion of the cup remains exposed, so that when the cup and packing are attached to the cast-iron by forcing the exterior band upon the same the cup will be brought in direct contact with the rear end of the cast-iron.

To explain the object of this arrangement, I will first allude to the manner in which the explosion of the charge is liable to separate the soft packing from the cast-iron when the expansion-chamber is formed in the soft metal without the use of the said cup. The force of the explosion, by expanding the packing metal into the grooves and against the whole circumference of the bore, produces so great a frictional resistance to the forward movement of the packing that the direct propelling force of the explosion is apt to tear the iron from the packing by breaking through the central portion of the latter. To prevent this, the packing metal has been made heavier; but thereby the weight of the rear portion of the projectile increased in a manner impairing greatly the accuracy of its flight. With the use of my improvement, however, the direct end-blow is transmitted through the cup, which is in the center in immediate contact with the iron and otherwise so thoroughly embodied with the packing metal that it will overcome the frictional resistance against the sides of the gun without any liability of the packing becoming separated.

In order that my said invention may be fully understood, I will now proceed more particularly to describe the same.

On reference to the drawings forming part of this specification, and in which similar letters of reference allude to similar parts throughout the several views, Figure 1 is a full size sectional view of a three-inch-case shot to which the packing metal is attached by my improved method. Fig. 2 is a sectional view of the metallic band and packing metal, as they appear before being forced upon the iron body of the projectile. Fig. 3 is also a sectional view of the band and packing metal, representing a modification of the method of combining the two, whereby the soft packing metal is made to surround the band on its outside. This plan is intended for projectiles used with bronze guns, which would be much worn and injured by immediate contact of the brass with the rifle-grooves and intervening fields of the bore. Fig. 4

represents in section the back portion of a projectile in which the exterior band is employed, as in Fig. 1, and which, in addition, is provided with the sheet-metal cup on the interior of the packing metal for the above-described purpose.

The bands A for small caliber may with advantage be made from drawn brass tubing of proper diameter and thickness, while larger sizes are better made from blanks of sheet metal, which should be so dovetailed together at the seam as to allow their being strongly jointed and soldered without the two thicknesses of metal overlapping each other. The thickness of the metal employed must be such as to give the band the required strength for transmitting to the body of the projectile the centrifugal motion imparted to the packing by the rifle-grooves of the gun.

To permit the perfect expansion of the packing metal, the band is, at the rear end, gradually reduced to a thin edge, as seen in the different views of the drawings.

B represents the packing metal; C, the cast-iron projectile proper, and D, Fig. 4, the interior cup of sheet metal, bearing against the body of the projectile and thoroughly united with the packing metal, into which an outwardly-bent flange, *d*, of the cup D is bedded, to assist in preventing the friction against the sides of the gun from detaching the packing metal.

A most effectual method of uniting the band A and cup D with the packing metal I have found by practice to be as follows: Having first tinned those parts of the band and cup with which the soft metal is to be united, I provide the same surfaces with any of the well-known soldering agents, and place the band (or band and cup, as the case may be) into a cylindrical mold, which has a convex bottom of the required shape to form the concave expansion-chamber, and which is entirely open at the top. Into this mold I then pour the requisite quantity of soft metal, and transfer the whole to a fire or furnace for heating the parts to the required degree for a perfect soldering of the sheet metal to the packing, and I prefer to agitate, while in its most heated state, the soft metal, so as to make it unite with the band and cup in the most thorough manner. I then place the mold upon a level surface and allow it to cool until the packing metal is sufficiently set to permit its removal

from the mold. To expedite the process, a sufficient number of molds should be used to keep one or two men constantly employed without having to await the cooling of one or a few molds. The band to which the packing metal has thus been attached is next drawn over the cast-iron, upon which it first may fit loosely. The whole is confined between concentric male and female spindles, the former of such shape as to fill the chamber in the back end of the projectile, while the female center embraces the conical point. While thus confined between the centers the band A is forced through a draw-plate having a circular opening of the exact diameter to which the band is to be reduced. The rear end of the band enters the draw-plate first, which, in passing over the band A, slightly reduces its diameter and thickness, and thoroughly unites the inner surface of the band with the iron, filling every pore and inequality in the latter, and impressing itself into any shallow grooves that may be purposely provided for resisting the torsional strain upon the band in firing. The front edge of the band, being by this drawing process made irregular in shape, is finally cut evenly round in a lathe.

Having thus described the nature and object of my invention, I wish to be understood as being well aware that the use of a band upon the soft-metal packing is not new, thin bands having been employed heretofore for the purpose of preventing the soft metal from being deposited in the corners of the grooves and thereby fouling the gun. This, however, differs materially from the object and nature of my improvement.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The described employment of a band, A, when embodied with the soft-metal packing and drawn upon the body of the projectile, substantially in the manner and for the purpose specified.

2. The use of a cup, D, of any form equivalent to the one herein shown, when combined with the soft-metal packing in the described manner, and bearing upon the back end of the projectile, substantially as and for the purpose set forth.

WILLIAM BOEKEL.

Witnesses:

LOUIS ZENNEGG,
JULIUS KLEIN.