

R. R. MOFFATT.
Construction of Ordnance.

No. 159,834.

Patented Feb. 16, 1875.

Fig. 1

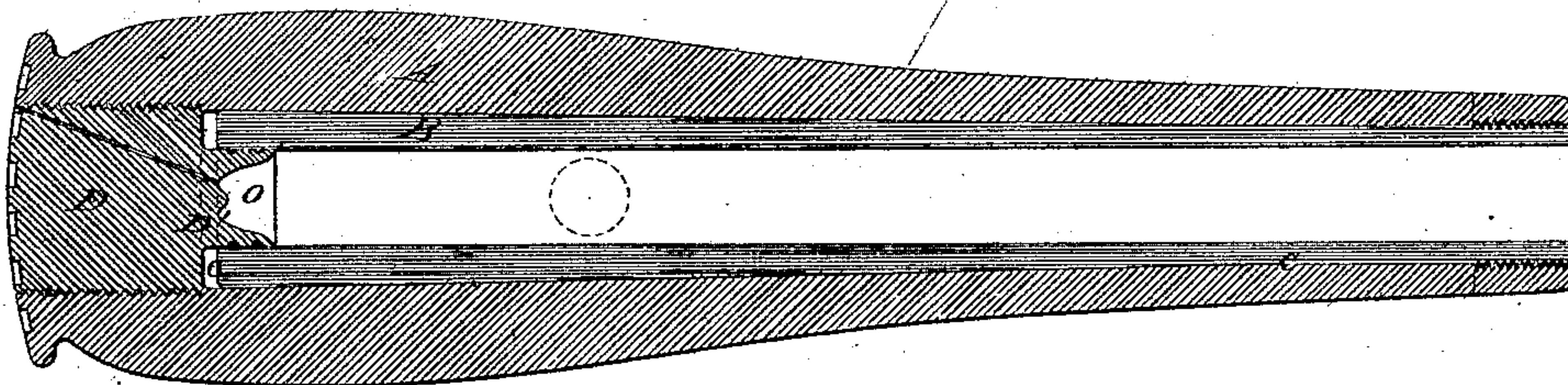
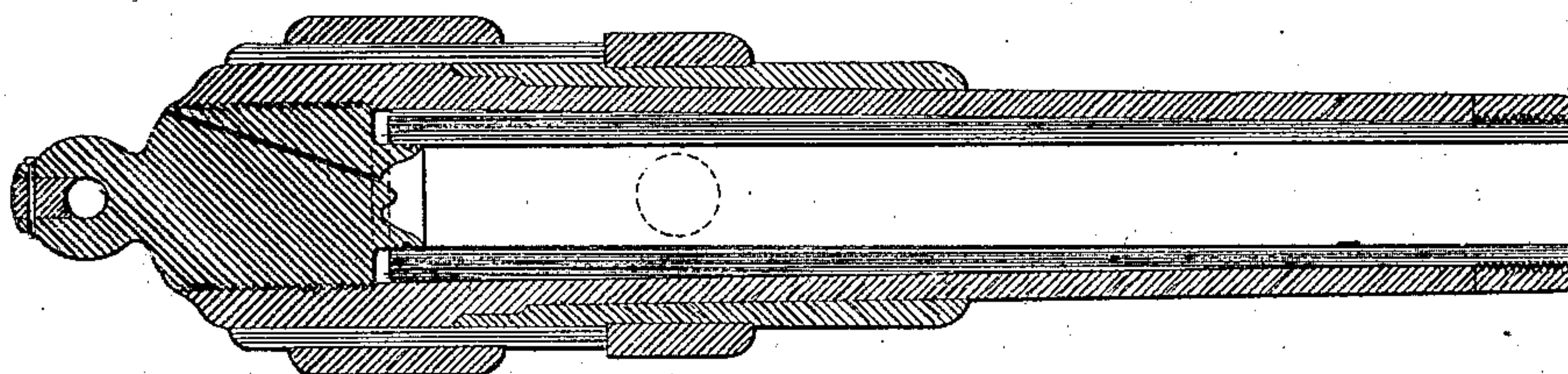


Fig. 2



Witnesses:

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RICHARD R. MOFFATT, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN THE CONSTRUCTION OF ORDNANCE.

Specification forming part of Letters Patent No. **159,834**, dated February 16, 1875; application filed February 4, 1875.

To all whom it may concern:

Be it known that I, RICHARD R. MOFFATT, of the city of Brooklyn, in the county of Kings, State of New York, have invented or discovered new and useful Improvements in Ordnance; and I do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following specification and the drawings accompanying the same.

This invention has for its object improvements in ordnance; and consists in a novel method of constructing guns of large caliber, so that the unequal expansion of the parts may not affect the gun injuriously.

It is known that when cannon are fired the inflamed gases from the powder, as also the friction of the projectile in its flight through the bore of the gun, produces great heat, a large portion of which is absorbed by the metal nearest the bore, causing it to expand with such force as to greatly strain the outer metal of the gun, into which the heat has not penetrated. This unequal expansive force is more severe on guns constructed with initial tension, as on the Rodman system, or when made from a number of cylinders shrunk one over the other, so as to bring the strength of the outer metal into more direct action to resist the explosive force of the powder. This expansive force of the inner metal of the gun materially aids the explosive force of the powder to rupture the cannon, particularly when fired rapidly, as in battle, or in cold weather, when the outer metal of the gun becomes more dense and brittle. The inner cylinder of a Whitworth gun has been known to expand longitudinally by the heat of firing, so as to increase its length one inch, causing it to project from the rear end of the gun. When the inner cylinder has a bearing upon the solid breech, as in the Armstrong and other systems, this force of longitudinal expansion tends to break the gun transversely.

The improvement I propose for guns of heavy caliber, both rifled and smooth-bore, is intended to obviate these injurious effects, caused by the unequal expansion of the metal in a gun in firing. It consists in a novel construction of the lining of the bore or inner cyl-

inder, which is made slightly tapering, being of a larger external diameter at its rear end than at its forward end. The breech-piece is firmly secured to the gun proper by means of a screw or otherwise, and its forward part projects into the cylinder or lining in such a manner as to form the chamber or bottom of the bore, and also to prevent the gases from escaping rearward. An open space is left between the rear end of the cylinder or lining and the breech-piece. Into this open space the said cylinder or lining is forced by its longitudinal expansion, and therefore it does not come into contact with the breech-piece. As the inner cylinder is tapered on its exterior surface, its longitudinal expansion would loosen it along its entire length to a greater or lesser degree, thus providing for the radial expansion, so that the gun is relieved from the strain of this radial expansion of the inner cylinder, and the tension of the outer metal upon the inner cylinder would always be the same, or nearly the same, under any degree of expansion or contraction of the inner tube or cylinder.

In the accompanying drawings, Figures 1 and 2 represent longitudinal central sections of guns embodying my invention.

A represents the body of a gun, such as the Rodman. B is a steel tube or cylinder, which contains the bore. This tube B has a larger external diameter at its rear end than at its forward end, and is tapered from the rear end to a point near its forward end, marked *c* on the drawing. It is then made perfectly cylindrical from this point to the muzzle. D is a solid breech-piece, which is secured to the gun A in any desirable manner. D' is a cylindrical projection on the breech-piece D, which enters the bore of the cylinder B and forms the bottom of the bore of the gun. This breech-piece D' contains the chamber of the bore, (marked *o*), and is formed so that the pressure of the gases will act upon its inner surfaces with such force as to prevent the gases from passing between its outer surfaces and the cylinder B. To further prevent the gas from escaping thus, grooves are made around the periphery of the breech-piece D', which permits of more elasticity to the metal sides, and also checks the gas from passing. *e* represents an open space between the steel tube or cylinder

B and the breech-piece D. This space is intended for the cylinder B to pass into when its length is increased by its longitudinal expansion.

The gun A should be shrunk upon the cylinder B with a proper amount of tension, and, if desired, this tension may be greater at one end of the tube than at the other end. If desired, the tapered tube may be inserted by hydraulic or other means with such force or pressure as to cause the necessary or desired amount of tension, and the tapered tube may be made so as to project beyond the muzzle of the gun A, with the projecting portion provided with a screw-thread in such a manner that a large nut may be placed thereon to secure it in place and prevent the tube from moving rearward.

If desired, this invention may be applied to guns made of cylinders shrunk one upon the other, as shown in Fig. 2, and the same principle may be applied to various systems of ordnance, such as breech-loaders.

The vent passes through the solid breech-piece D and D', as shown in the drawings.

The operation of the gun is as follows: When it is fired the steel tube B becomes highly heated, and is expanded in all directions. It is obvious that the longitudinal expansion is much greater than the lateral, and as it expands longitudinally it enters the open space c, so that there is no pressure from this expansion upon the breech-piece D or the gun

A. The longitudinal expansion of the cylinder B would loosen the said cylinder in the gun A, it being tapered, were it not for the radial expansion of said cylinder, which fills the space that would be thus made, so that the tension of the outer metal A upon the cylinder B will always remain the same, or nearly the same, under all degrees of expansion or contraction. As the gun cools after firing the metal contracts into its former position with similar force. The proper taper for the cylinder B should be ascertained with mathematical accuracy.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I do not confine myself to these exact details; but

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

1. The tapered cylinder B, in combination with the gun A, arranged so that its longitudinal expansion will relieve the pressure on the gun A caused by the radial expansion of the cylinder B, substantially as described.

2. The combination, in a gun, of a lining tube or cylinder, B, and breech-plug D, when arranged so that there is a space between the rear end of the tube and the breech-plug, as and for the purpose specified.

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Witnesses:

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