(No Model.)

D. M. MEFFORD.

ORDNANCE.

No. 335,606. Patented Feb. 9, 1886.

Fig. 1

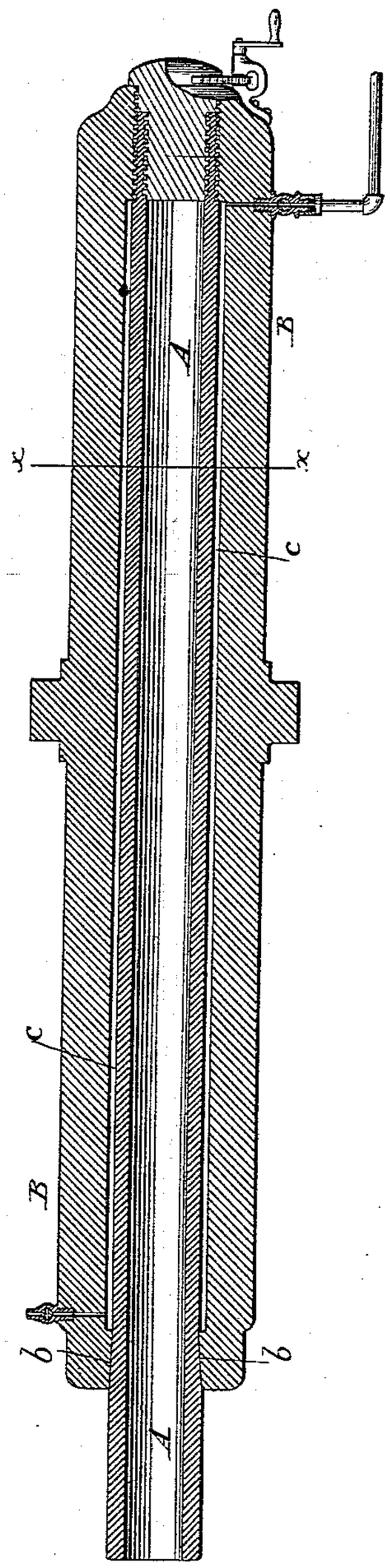
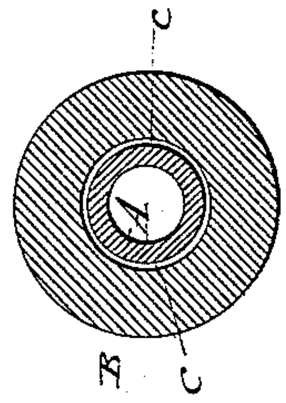


Fig. 2.
on line x—x



WITNESSES

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INVENTOR

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By C. F. Dodge, Atty.

UNITED STATES PATENT OFFICE.

DAVID M. MEFFORD, OF TOLEDO, OHIO, ASSIGNOR TO THE NATIONAL HEAVY ORDNANCE COMPANY.

ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 335,606, dated February 9, 1886.

Application filed May 9, 1885. Serial No. 164,930. (No model.)

To all whom it may concern:

Be it known that I, DAVID M. MEFFORD, of Toledo, in the county of Lucas and State of Ohio, have invented certain Improvements in Ordnance, of which the following is a specification.

This invention has reference to the construction of heavy ordnance, and is designed to distribute and equalize the strains and pressure, and to avoid the dangers incident to the unequal heating and consequent unequal expansion of the gun at different points.

To this end it consists in the combination, with the barrel or gun-tube, of an external jacket or re-enforce applied to leave around the barrel a space or chamber adapted for the close confinement of water, the parts being constructed and arranged with this view in the peculiar manner hereinafter detailed.

To those familiar with heavy guns it is well known that the heat generated at the time of the discharge causes the inner or central portion to expand before the heat is conducted to the exterior and while the outer portion of the metal remains in its normal condition, and that the gun is consequently subjected to very destructive strains other than those due to the direct pressure of the gas. It is also known that in guns which are "built up" the strains are unequally distributed, owing to the impossibility of fitting the parts with absolute accuracy and uniform firmness. I avoid both of these difficulties by making use of a relatively thin gun tube or barrel, which is free to expand and contract independently in connection with a strong surrounding re-enforce, and a fluid body securely confined between the re-enforce and barrel, for the double purpose of lessening the transmission of heat from one to the other and of transmitting the outward pressure uniformly.

Referring to the drawings, Figure 1 is a longitudinal central section of my gun. Fig. 2 is a cross-section of the same on the line *x x*.

In the drawings, A represents the barrel or gun-tube open from end to end and with a rifled or smooth bore, as preferred. At its rear end it is threaded externally to engage the re-enforce, and near its forward end it is enlarged and tapered externally, as shown at *b*, thus affording a conical bearing for the forward end of the re-enforce. The re-enforce B consists of a cylindrical or approximately-cylindrical body of cast or wrought metal with a central opening from end to end to receive the barrel, its forward end being fitted tightly upon the tapered surface *b*, and its rear end threaded and screwed firmly on the rear end of the barrel. The tapered seat is of diminishing diameter toward the breech, in order that the barrel may elongate in a forward direction as its temperature is increased, and the taper is such that the expansion of the barrel radially will compensate for the loosening effect which would otherwise occur by reason of the conical enlargement being moved forward out of its bearing. It follows, therefore, that a tight joint is maintained between the two parts, notwithstanding the difference in their expansion and contraction. Between its end bearings the re-enforce is enlarged internally to leave an annular space, *c*, between it and the barrel, for the reception of water, an alkaline solution, or other fluid. A cock or cocks such as shown, or of any other appropriate character, are provided to permit the introduction and confinement of the fluid, which will completely inclose the barrel from the breech to near the muzzle. At the breech end the barrel is threaded internally, and the re-enforce also counterbored and threaded internally, to receive the breech-plug, which is made of two diameters and threaded externally to engage the barrel and re-enforce, as shown. The threads may be of the mutilated or interrupted type commonly used in ordnance to permit the release of the plug by a partial rotation. If desired, breech-closing mechanism of any other suitable type may be substituted.

Before firing the gun the space *c* is filled with the fluid, preferably under pressure, and the fluid confined securely in place. When the firing occurs, the barrel heated by the gases and the strain expands. The fluid medium transmitting the strain equally to the surrounding re-enforce supports the barrel externally, and at the same time lessens by absorption the transmission of heat to the outer metal. Immediately after firing the gun the cocks may be opened and the fluid wholly discharged, or

the upper cock only opened in order to permit the escape of sufficient fluid to compensate for the expansion of the inner tube or barrel.

I am aware that guns have been variously constructed with water-tubes formed or incorporated in their body portions.

I am also aware that barrels of otherwise ordinary construction have been surrounded by thin jackets designed to receive water for the purpose of cooling the barrel, the jacket being relatively thin, and not being designed to receive any portion of the strain.

I believe myself to be the first to make use of a barrel which is relatively thin in connection with a jacket or re-enforce of great strength, and an intervening tightly-confined body of incompressible or practically incompressible fluid, whereby the strains are transmitted directly from the barrel to the re-enforce.

I also believe myself to be the first to combine a thin barrel with a surrounding re-enforce and fluid medium in such manner that the barrel may expand and contract independently of the re-enforce.

While I prefer to retain the particular details of construction described and shown herein, it is to be understood that the details may be modified without passing beyond the limits of my invention, provided the mode of action and results herein stated are secured.

Having thus described my invention, what I claim is—

1. In a cannon, the combination of a barrel, an encircling re-enforce or jacket closely joined at its ends to the barrel, and adapted to slide at one end thereon, and a fluid medium closely confined between the re-enforce and barrel and surrounding the latter, substantially as described, whereby the internal strains are transmitted through the fluid medium to the re-enforce.

2. The combination of the thin barrel or gun-tube, the relatively thick re-enforce joined at one end rigidly to the barrel and connected thereto at the opposite end by a tapered sliding joint, and an incompressible fluid closely confined between the re-enforce and barrel, whereby the internal strains and pressure are transmitted through the fluid medium to the re-enforce, and the barrel permitted to expand and contract without danger of rupturing the gun.

3. The barrel in combination with the re-enforce applied thereto to leave the fluid-receiving space between them, the re-enforce being tightly secured to the barrel at one end by a screw-connection and closely united thereto at the opposite end by a sliding connection, whereby they are adapted to closely confine the fluid between them, but the two parts permitted to expand and contract independently.

4. In a cannon, the barrel threaded externally at the breech and provided with the conical seat *b*, in combination with the external re-enforce tightly seated at its ends upon the thread and the seat, respectively, and adapted to leave an intervening annular space for the reception of fluid medium, as described and shown.

5. In a cannon, the combination of a barrel, an external re-enforce applied thereto to leave an intervening fluid-space and joined tightly thereto at the ends, and cocks for the admission and release of the fluid, whereby the fluid may be confined in position during the firing of the cannon, in order to transmit the strains from the barrel to the re-enforce, and subsequently discharged to prevent the transmission of heat to the re-enforce.

In testimony whereof I hereunto set my hand, this 2d day of May, 1885, in the presence of two attesting witnesses.

DAVID M. MEFFORD.

Witnesses:

JOHN T. ARMS,

GEORGE I. HILL.