(No Model.)

E. MAITLAND.

CONSTRUCTION OF ORDNANCE.

No. 403,684. Patented May 21 1889.

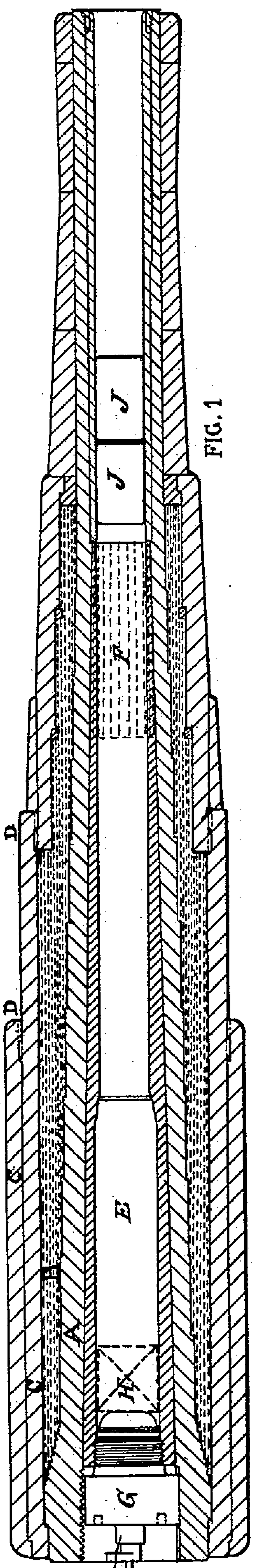

FIG. 1

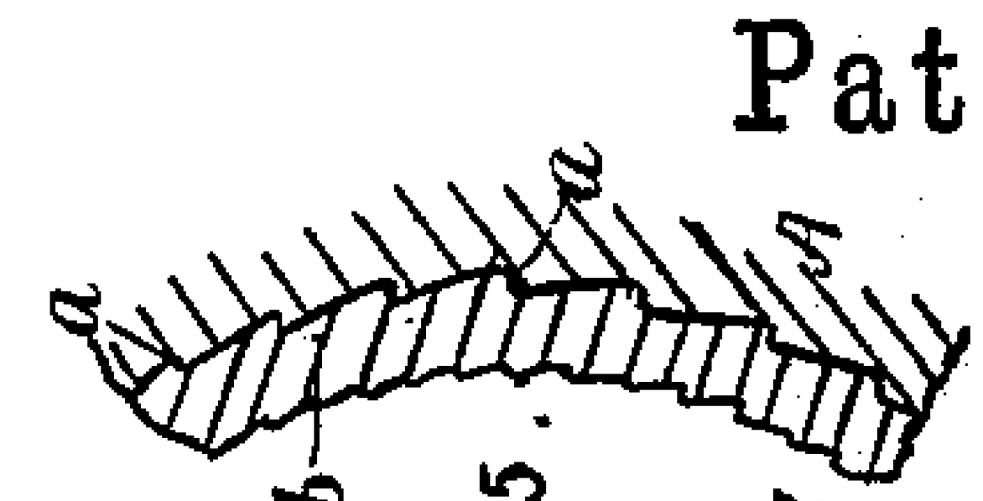

FIG. 5.

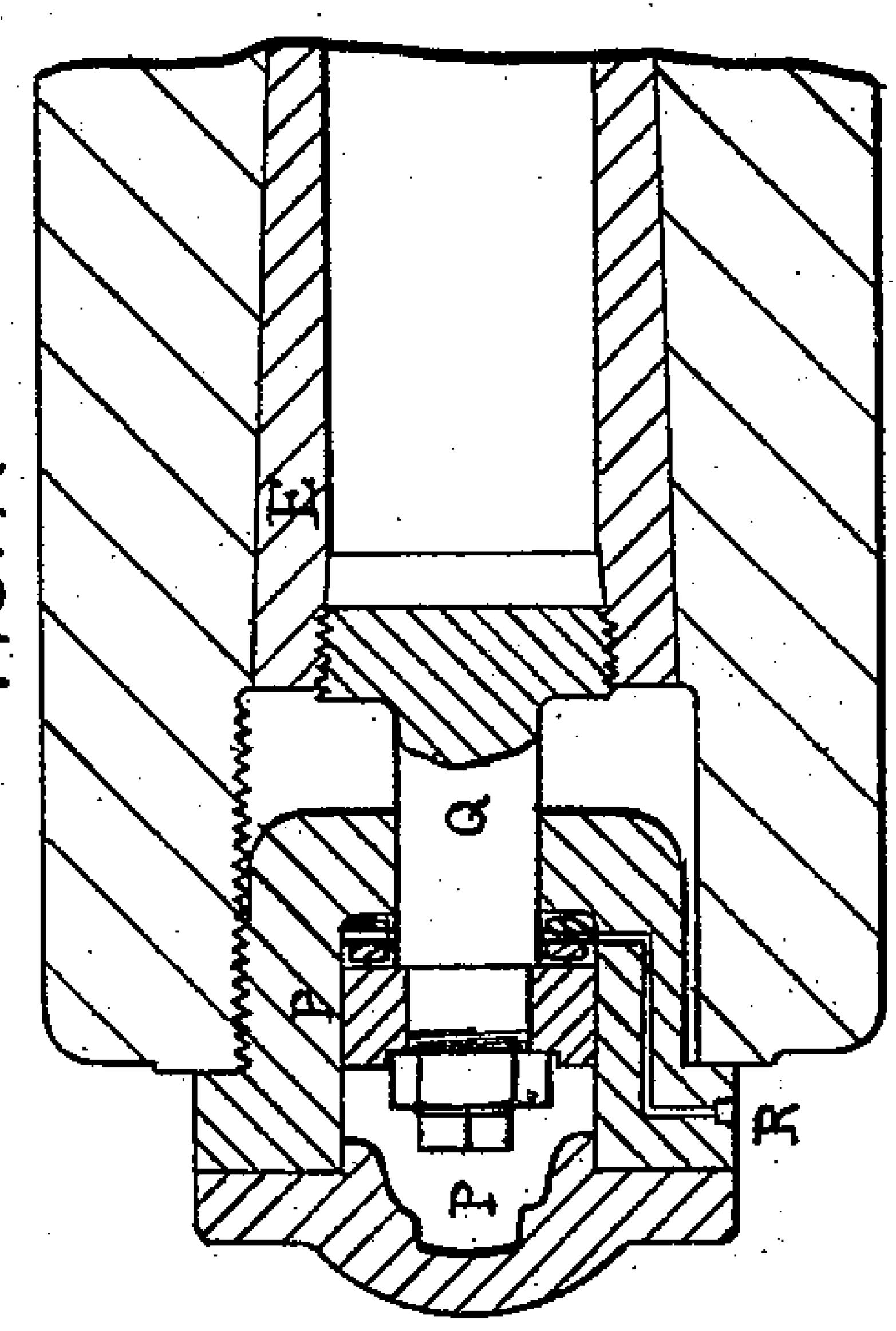

FIG. 4.

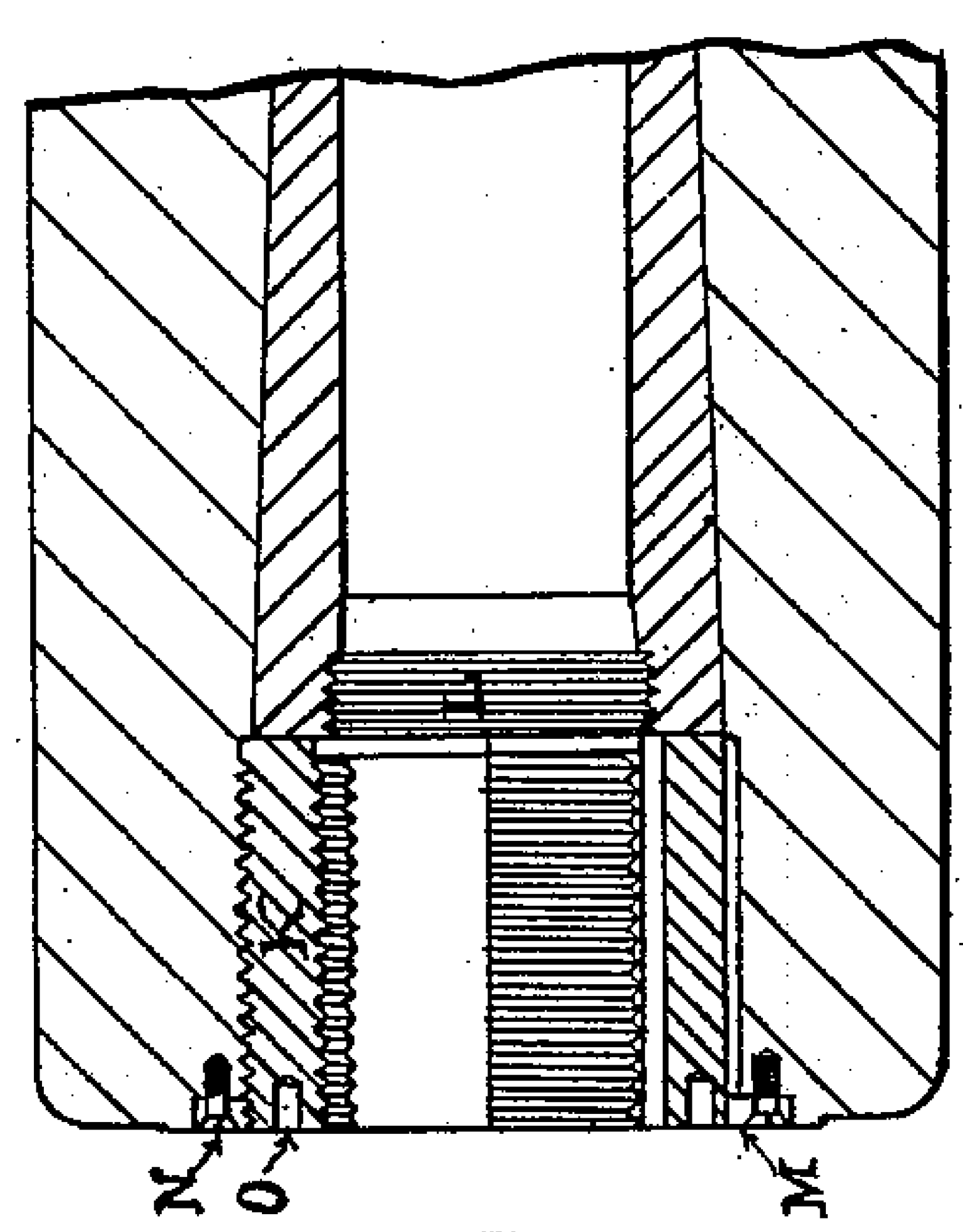

FIG. 2.

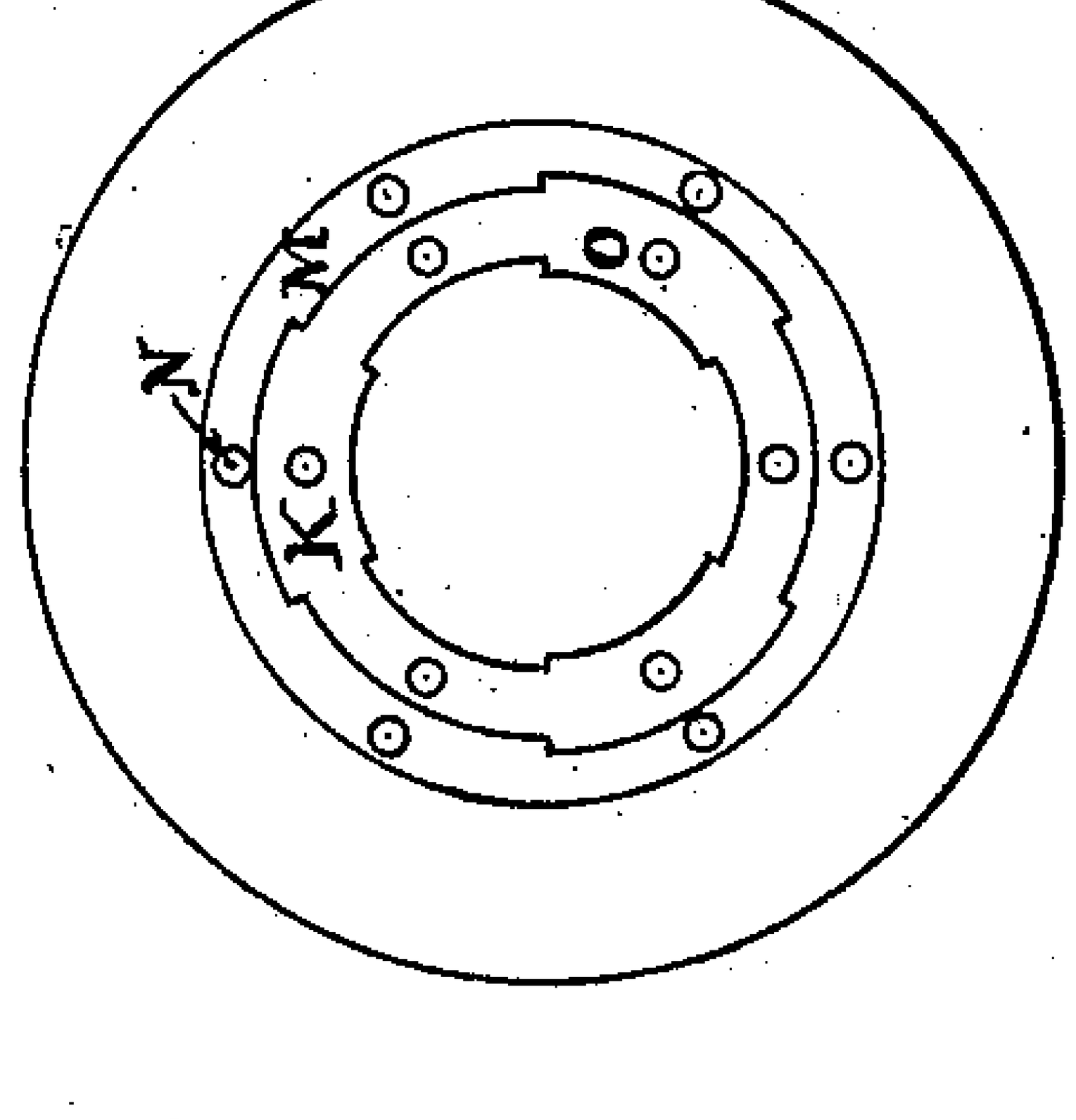

FIG. 3.

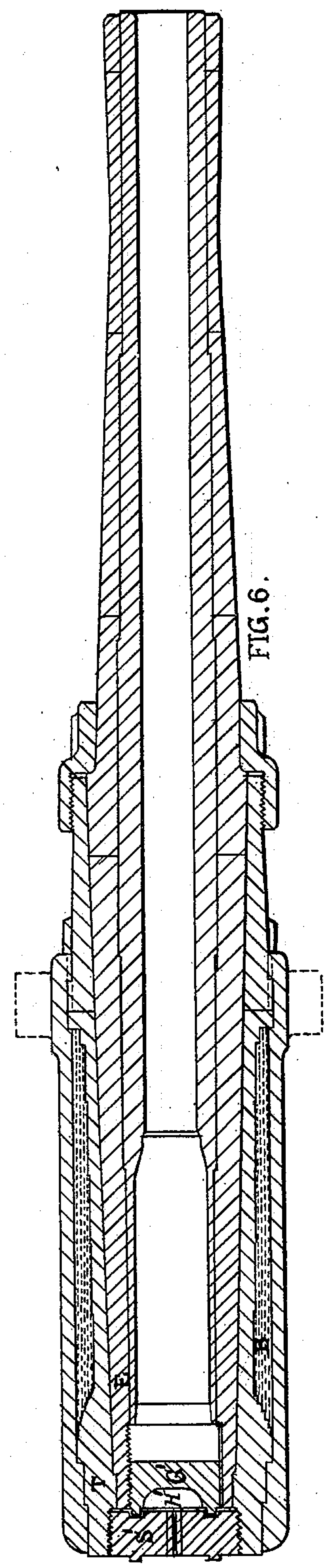

FIG. 6.

WITNESSES { J. W. Jones
Thomas Swire Muspratt

INVENTOR
Eardley Maitland

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

EARDLEY MAITLAND, OF LONDON, COUNTY OF MIDDLESEX, ENGLAND.

CONSTRUCTION OF ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 403,684, dated May 21, 1889.

Application filed June 21, 1887. Serial No. 242,086. (No model.)

To all whom it may concern:

Be it known that I, EARDLEY MAITLAND, a subject of the Queen of Great Britain, residing at 35 Grove End Road, London, in the county of Middlesex, England, have invented certain new and useful Improvements in the Construction of Ordnance, chiefly for the easy removal and insertion of inner tubes and liners; and I do hereby declare that the following is a full, clear, and exact description thereof.

This invention has reference to the removal of tubes and linings from ordnance; and it consists in the improvements hereinafter described and set forth.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal section of a piece of ordnance having a removable lining or tube adapted for removal in accordance with my invention. Figs. 2 and 3 are respectively a detail section and rear end view illustrating one form of my improved devices for retaining the lining or tube in position, and which can be utilized in the operation of removing said tube or lining. Fig. 4 is a detail sectional view showing the hydraulic appliances for removing the lining; Fig. 5, a detail sectional view showing the contiguous surfaces of the lining and main tube to prevent the former from turning; and Fig. 6 is a longitudinal sectional view of a piece of ordnance illustrating the improvement utilized in connection with a sectional gun.

The wear of the charge on the surfaces of the bores of guns is so great as to necessitate frequent renewal of the worn parts, and it is at present necessary to dismount ordnance and transport the same to machinery for boring out the worn portions and inserting a new lining, which are expensive and tedious operations. I therefore build ordnance in such a manner that the part which is subject to wear can be removed and a new inner tube inserted ready for service without undergoing the aforesaid expensive and tedious operations; and the same system is applicable also to the making of guns in parts for easy transport and building together for use, and I do this by making the main tube A of the gun, which lies immediately outside the inner lining or tube, E, which is subject to wear, of such a form, preferably conical, with a taper on all sides of the interior of one in forty or other suitable taper, that a liner, E, of corresponding form can be pushed in, and I lock said liner at point F from rotating within the main tube by grooves in the tube and projections *a* on the liner to fit these grooves; but I cut grooves in the liner and make projections *b* in the tube. (See Fig. 5.) I may, however, adopt such other form, polygonal or otherwise, as may be most suitable. I fully prepare the liner E to fit the main tube A and have the rifling of the said liner in proper position to match the rifling of the said main tube or another liner within the main tube, preferably by making the number of exterior ribs or grooves a division of the number of rifled grooves in the bore, if the removable liner should be so arranged as to fit only a portion of the length of the main tube, and if the other portion of the length of the main tube should be rifled or lined and rifled.

The removable liner E may extend the entire length or any part of the length of the bore, and may be divided into one or more pieces, either transversely or longitudinally, and as it is important that permanent expansion of the main tube A by firing should be prevented I strengthen the same by such means as may be most suitable, preferably by shrinking on hoops or by winding on wire, B, of such material, preferably steel, and at such tension as may best suit the purpose, and I shape the exterior of the main tube so as to conform generally to the shape of the interior, and if I support it with wire wound on I increase the diameter by a series of steps, each step being preferably twice the thickness of the wire, and I build the exterior of the gun over the wire or over the hoops, in the usual way now adopted in the British service, with tubes and hoops, and locking-hoops, shoulders, and keys, as described in the specification to English patent, granted to me on the 2d of February, 1884, No. 2,600.

If the gun lined in this manner is a breech-loader and has the liner E put in from the rear, the said liner preferably extends so far back as to contain the obturator or cartridge, or other means of preventing the escape of

gas to the rear, and further extends back sufficiently to permit an attachment presently to be described.

Behind the liner is inserted a ring or bush, K, which is fastened into the main tube, or into a breech piece or tube embracing the main tube, so as to keep the liner E in its place, and this ring may be either screwed in or held by an interrupted screw, or in such manner as found most convenient, and inside this ring plays the breech block or screw G, which may be of the ordinary kind; or the mechanism may be of any breech-loading type.

When the liner E is to be taken out, the breech-screw G or other mechanism is removed, and the ring keeping the liner in place is also removed. A plug, Q, can then be fixed firmly into the end of the liner E, which extends back, as stated above, sufficiently to permit the attachment, which may be by screw-threads or otherwise, and this plug is provided with a bearing at the exterior for forcing out the liner by hydraulic devices P, or by mechanical power. The block or screw G can also be provided with an obturator or cartridge case, H, and firing apparatus S complete, so that if the gun be loaded in the usual way or from the muzzle with such powder and shot as may be sufficient the charge can be fired and the pressure of the fired charge employed to drive out the liner. It may be found suitable to place the shot J J loosely in the bore in front of the junction of the removable liner with the main tube or its liner, or in such other position as may be found most convenient.

If the gun is a muzzle-loader and has the liner put in from the rear, I force out the liner in substantially the same way, except as regards the parts in which the obturator or the cartridge-case are alluded to.

To force out the worn liner, I fit the breech end of the liner to receive hydraulic or mechanical power, as before explained, but I fix a plug, G′, in the screw-thread after removing the breech-screw and obturator, and I fix another plug, S′, with firing apparatus in the rear of the main tube or other portion of the gun embracing the liner in the space H′, and between these two plugs I place a charge of powder or other explosive which on being fired pushes out the liner. The same arrangement, *mutatis mutandis*, applies to a muzzle-loader having the liner inserted from the front.

By reference to Fig. 1 it will be seen that A is the main tube. B is the wire wound outside the tube. C C are hoops with locking-shoulders and keys D D. E is the taper-liner with grooves and projections at F to prevent turning and match rifling. G is a block or screw screwed into the liner, but free to move with the liner and is fitted with firing arrangement and obturator. H is the space for the charge and J J the shot.

In Fig. 3 the ring K, holding the liner E in its place, is prepared for receiving the breech-screw and firing arrangement. L is the screw part in the liner, which may be covered with a ring while the gun is in use. M is a locking-ring with projections to prevent the ring K from turning and secured by screws N N. O O are holes for turning.

In the hydraulic arrangement shown in Fig. 4 the cylinder P is screwed into engagement with the rear threaded end of the main tube A, and contains the piston of the plug Q, which is threaded at its free end to engage the threaded end of the lining E. The waterway or port R is suitably connected with a pump or accumulator.

In Fig. 6 I have represented another system of separating the parts of a sectional gun for facilitating transport. G′ is a plug screwed into the tube with a cavity for the blowing-out charge. S is a plug screwed into the outer tube, T, and fitted with vent. The plug and block are both removed to receive the breech-screw and firing arrangement.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with a piece of ordnance having a tapering bore and grooves or recesses near the center thereof, of a removable lining having exterior teeth or projections on its forward portion to enter said grooves or recesses and provided with an internal screw-thread at its rear, and a plug, Q, engaging said screw-thread and having an extended portion, substantially as and for the purpose stated.

2. The combination, with a piece of ordnance consisting of a series of sections and a continuous main tube having a tapering bore, grooves or recesses near the center thereof, and a rear screw-thread, of a removable lining made in a single piece and having teeth or projections entering said grooves or recesses and provided with an internal screw-thread at its rear end, the threaded ring engaging said rear screw-thread, and the block engaging said internal screw-thread, substantially as set forth.

3. The combination, with a piece of ordnance, of a lining located in the bore of the piece, a ring for retaining said lining and having grooves and recesses, and a locking-ring fitting said grooves and recesses and secured to one end of the barrel by screws passed therethrough, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of June, 1887.

EARDLEY MAITLAND.

Witnesses:
H. W. JONES,
THOMAS LIVERE MUSPRON.