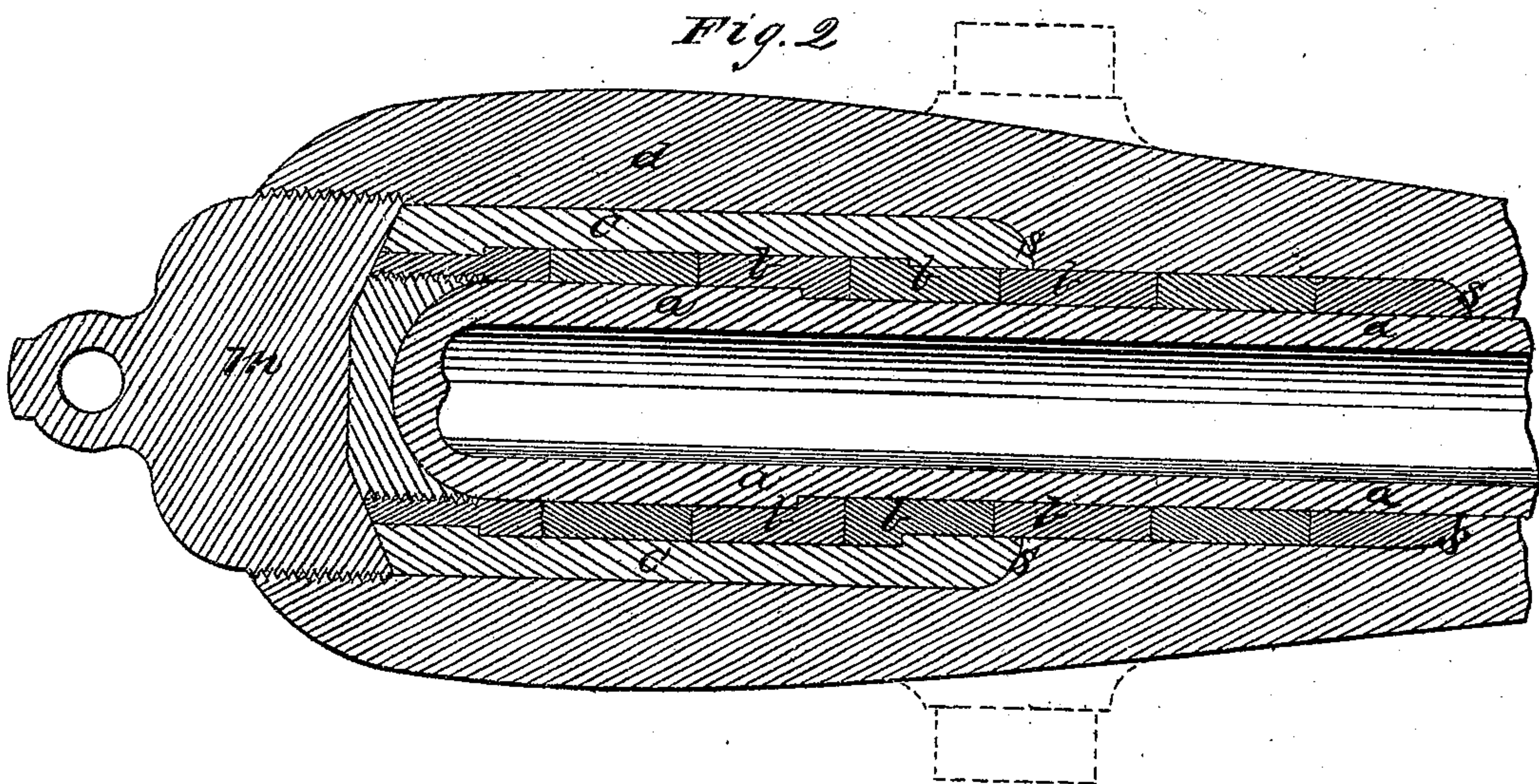
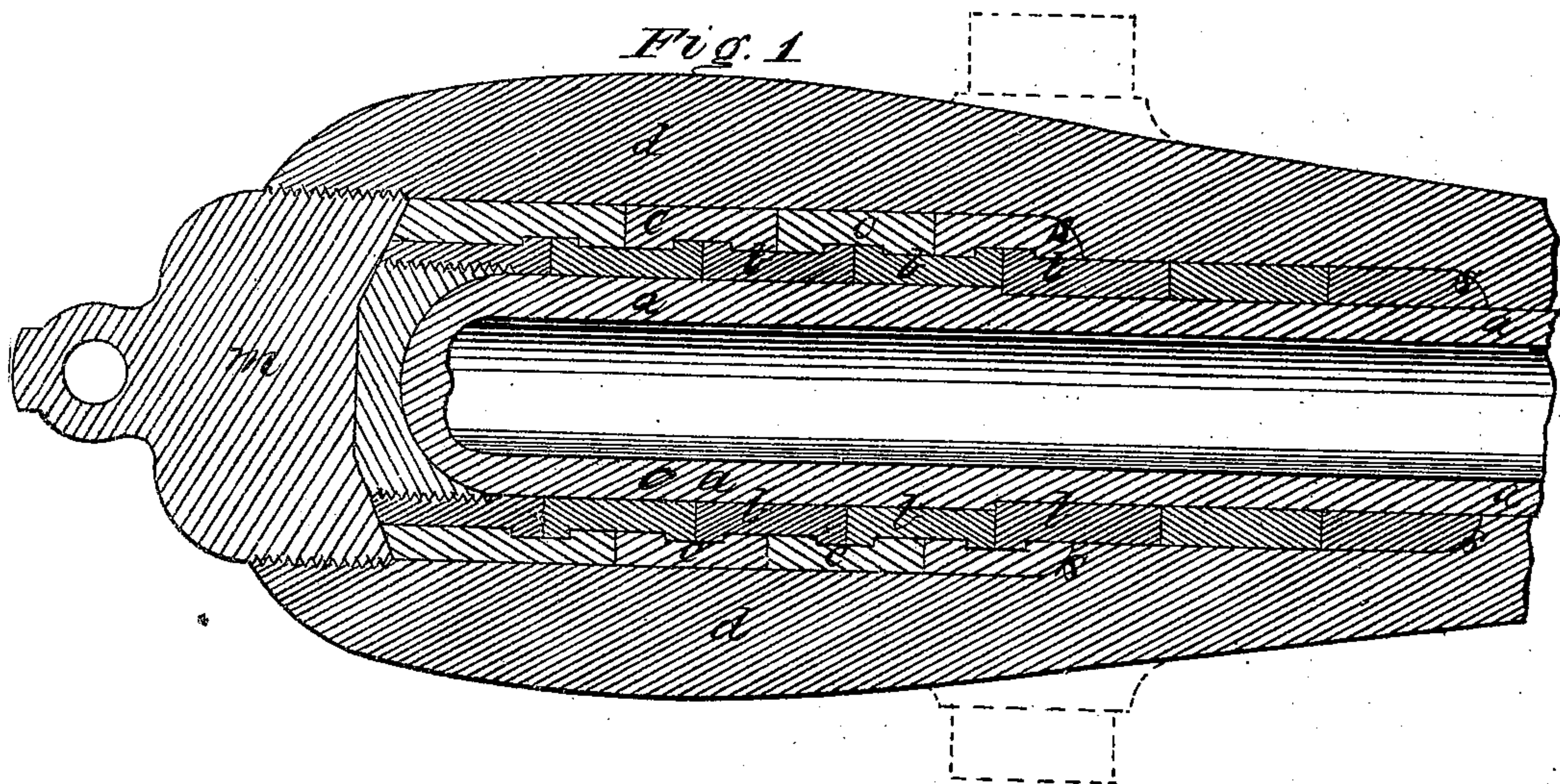


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Ordnance, and Methods of Constructing the Same.
No. 152,678.

Patented June 30, 1874.



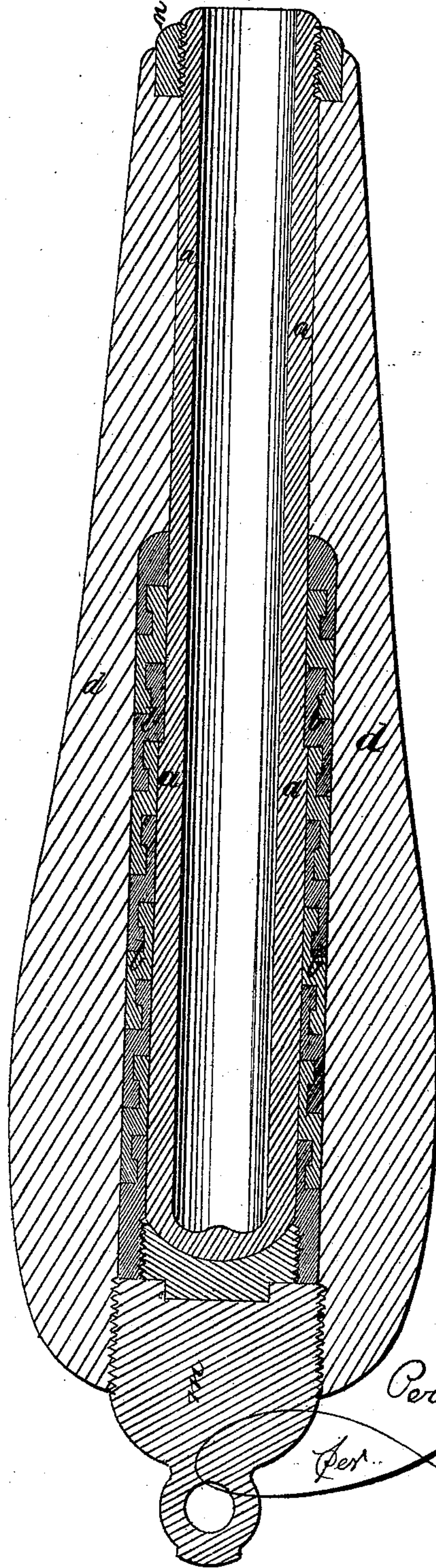
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Fig. 3.



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PERCIVAL M. PARSONS, OF BLACKHEATH, ENGLAND.

IMPROVEMENT IN ORDNANCE AND METHODS OF CONSTRUCTING THE SAME.

Specification forming part of Letters Patent No. **152,678**, dated June 30, 1874; application filed March 16, 1874.

To all whom it may concern:

Be it known that I, PERCIVAL MOSES PARSONS, of Blackheath, in the county of Kent, England, have invented new and useful Improvements in Ordnance; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming a part of this specification.

My improvements in ordnance relate, first, to the mode of manufacturing the inner tube of the gun, whereby the fibers of the metal are arranged spirally and the capacity of resistance to strains greatly increased.

To effect this object, I first cast the ingot of steel as usual. I then draw it down, by hammering or otherwise, until it approaches the finished size, leaving the two ends square or of such other convenient form as may be necessary. The ingot or block is then brought to a suitable heat in a furnace, and is twisted a sufficient number of times, which can be accomplished by fixing one end in a box or chuck attached to an axle, which is made to revolve in suitable bearings, while the other end is gripped and held stationary in fixed jaws or turned in the opposite direction. By this operation the fibers at and near its exterior, together with any lines of weakness caused by defects in the original casting, which were previously placed in a longitudinal direction, are thereby made to assume the spiral direction required. It is then rehammered, and, if necessary, the operations may be repeated. The effect of the twisting, while it places the fibers on the exterior in a spiral direction, will also be to stretch the metal considerably; but the rehammering will consolidate it, and in carrying out the operation judgment must be exercised to arrest the twisting before the fibers begin to tear, when the tube should be again hammered or rolled, and when reheated it may be twisted and hammered or rolled again as often as necessary.

My improvements relate, secondly, to the method of constructing steel lining-tubes for guns, intended for insertion into smooth-bore cast-iron guns for the purpose of converting them into rifled guns, or into a cast-iron casing for the purpose of making new guns.

In guns hitherto constructed on this system, (*i. e.*, with a cast-iron exterior,) the tube surrounding the breech end of the *a* or inner tube, which forms the bore of the gun, has been formed in one piece, cast in a hoop, and drawn down lengthwise, by which process of manufacture longitudinal lines of weakness are liable to be developed, in the manner before described. Now, according to this part of my invention, instead of making the second tube in one piece, as hitherto practiced, I employ a number of separate rings or hoops of convenient width, formed by hammering or rolling or by both operations, combined in such a manner that the diameter of the ring is increased during the operation, and the metal is thereby extended or drawn out circumferentially, and the fibers and any lines of weakness developed by flaws in the original casting are placed in a circumferential direction. The inner or *a* tube having been turned to the requisite size, I shrink or force onto its breech end a sufficient number of these rings bored to the requisite size, side by side, to form the re-enforce or *b* tube. I then turn them, leaving bands or fillets at their edges of slightly larger diameter than the intermediate portion between them. I then prepare another series of rings of the requisite size in relation to the first series; these I bore out with an annular recess in each corresponding to a pair of bands or fillets of two adjacent rings of the first series; this second series of rings are then expanded by heat, and placed over the first series in such a position that they will break joint with them, and so that the bands or fillets formed on the edges of the first series will fit into the annular recesses formed in the second series, by which means the rings will be connected longitudinally, and form in effect a continuous tube, and may be treated as such to impart longitudinal strength to the inner tube by means of shoulders and screws, or simply by the adhesion of their surfaces, or by other means.

In the drawing hereunto annexed, Figure 1 shows a longitudinal section of a gun with a cast-iron casing having the steel inner tube constructed in this manner.

a is the inner tube. *b b* are the first series of rings, with bands or fillets on their edges;

c c, the second series of rings, with annular recesses bored in them, each embracing a pair of the bands or fillets of the first series; and *d* is the cast-iron casing of the gun. In some cases the inner or *a* tube may be re-enforced by a layer of rings in conjunction with a tube made in one piece, either surrounding or surrounded by the layer of rings, in which case the rings may be made without the bands or fillets. These arrangements are shown in Fig. 2, which represents a longitudinal section of a gun. The rings are shown surrounded by the tube in one piece.

a is the inner tube. *b b* are the rings surrounding it, and *c* is the tube in one piece surrounding the rings; and *d* is the cast-iron casing. When only a single additional layer is required to re-enforce the inner or *a* tube, rings may be used, each having about half their thickness turned away for a portion of their width on one side, and a corresponding portion on the other side bored out, so as to fit onto the part turned down on the adjacent ring, slight shoulders being formed to lock into each other, and connect them longitudinally. This arrangement is shown by Fig. 3, where *a* is the inner tube, and *b b* are the series of tubes surrounding it, locked into each other; and *d*, the outer casing of cast-iron. When the inner or *a* tube, which forms the whole bore of the gun, has sufficient longitudinal strength, alone or in combination with the outer cast-iron casing, the requisite number of plain rings may be simply shrunk or forced onto its breech end in one or more layers.

My improvements relate, thirdly, to the form of the breech end of the lining-tube, and the interior of the cast-iron casing into which it is fitted, and the general combination of the parts in guns of this description.

In guns hitherto constructed on this system, the breech end of the lining-tube where the re-enforce occurs, and the recess made in the breech end of the casing to receive it, have been made conical, which form requires special machinery to bore out the casing, and offers difficulties to the proper fitting of the tube, in

order to obviate which I form the breech end of the tube cylindrical, and reduce it in diameter in steps toward the muzzle, as required, and make the interior of the casing in a corresponding form. The tube is inserted into the cast-iron casing at the breech end, and is secured by a breech-screw, and in order to insure greater security, and relieve the breech-screw of a portion of a recoil, I employ in combination with the same a nut screwed onto the end of the inner or *a* tube, let into a recess bored out of the muzzle end of the cast-iron casing. These improvements are shown in Figs. 1, 2, and 3, in which it will be seen that the lining-tube is cylindrical, and reduced in diameter in steps at *s s*. The breech-screw *m* secures the lining-tube in the cast-iron casing, and *n* is the nut screwed onto the muzzle end of the inner or *a* tube, and fitting into a recess in the muzzle of the cast-iron casing.

I do not claim, broadly, a gun-tube having the fibers of the metal disposed spirally; but

Having thus described my invention, what I claim is—

1. The method herein described of manufacturing a gun-tube, the ingot from which the same is to be made being first formed at one or both ends into suitable shape for application of grippers or holding devices, and then twisted and hammered, in the manner and for the purpose specified.

2. The combination, with the cast-iron casing *d* of the inner or bore tube *a*, of a series of interlocked re-enforcing rings, *b*, as and for the purpose specified.

3. The combination of the breech-screw *m* and muzzle-screw *n* with the inner tube *a* and casing *d*, as shown and described, for the purpose specified.

The above specification of my invention signed by me this 23d day of January, 1874.

PERCIVAL MOSES PARSONS.

Witnesses:

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