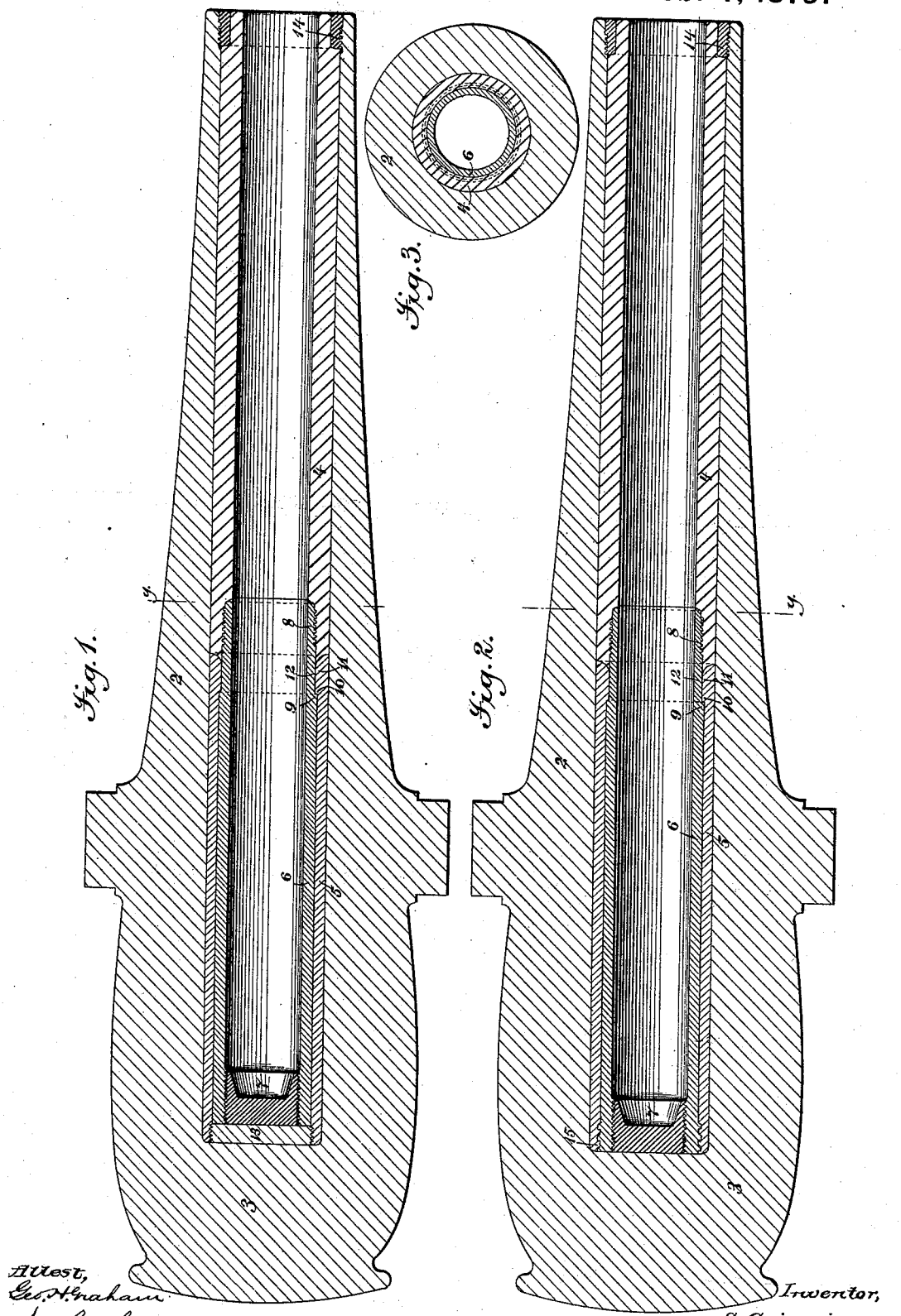
# S. CRISPIN.
## Lining-Tube for Ordnance.

**No. 211,839.** **Patented Feb. 4, 1879.**




Attest,
Geo. H. Graham
Wm. C. Hespe.

Inventor,
S. Crispin.
by Munson & Philipp, Attys.

# UNITED STATES PATENT OFFICE.

SILAS CRISPIN, OF NEW YORK, N. Y.

## IMPROVEMENT IN LINING-TUBES FOR ORDNANCE.

Specification forming part of Letters Patent No. **211,839**, dated February 4, 1879; application filed March 12, 1878.

*To all whom it may concern:*

Be it known that I, SILAS CRISPIN, of the city, county, and State of New York, have invented an Improvement in Ordnance, of which the following is a specification:

This invention relates to improvements in that class of heavy ordnance or guns which are constructed of a cast-metal or built-up body, and provided with a lining-tube of steel, wrought-iron, or other homogeneous or suitable metal, the invention consisting in an improved structure of the said lining-tube and mode of securing its parts together, whereby the longitudinal strength of the system is increased and an efficient arm is produced at a moderate cost, all of which will be particularly hereinafter described.

In the accompanying drawings, Figures 1 and 2 are longitudinal sections, the former showing a gun constructed according to my invention, and the latter a modification thereof, while Fig. 3 shows a cross-section on lines *y y* of said Figs. 1 and 2.

The body 2 of the gun is formed in the usual manner by casting, its breech end 3 being enlarged in its dimensions by a suitable form of the mold, or so shaped by means of re-enforcing bands, as is well understood. Such a gun-body, or one which has been constructed for use as a smooth-bore, as the well-known Columbiad or Rodman, is bored out to a proper size to receive my improved compound lining or tube. This compound lining or tube, the parts of which may be constructed of wrought-iron, steel, or other homogeneous or suitable metal, is composed of three separate sections or tubes, 4 5 6, which are constructed, assembled, and combined as will now be described.

The inner tube is made up of two sections or tubes, constituting a front member, 4, and a rear member, 6, which are screwed or otherwise locked together, and preferably supplied with a closing-plug, 7, at the breech end; and the outer tube or jacket, 5, is constructed to perfectly fit the rear member, 6, of the inner tube, upon which it is shrunk and to which it is locked, as will presently more fully appear.

The section or tube 4, which forms the front member of the inner tube, is constructed of proper metal and of a length about equal to one-half of that of the gun, its dimensions corresponding externally with those of the bore of the gun and interiorly with the caliber designed for the finished gun.

The section or tube 6, which forms the rear member of the inner tube, is of a length which will, in connection with the front member, 4, constitute a tube equal in length, or nearly so, to that of the bore of the gun. Its internal diameter is the same as, and its thickness is about one-half that of, the front member 4. At its forward end this rear member 6 is turned or cut away, so as to provide an annular shoulder, 9, and a seating-surface or recess, 12, and is also provided with a screw-thread, 8, properly shaped to fit into a screw-threaded socket formed in the rear end of the said front member, 4, the two members 4 and 6 of this inner tube being thus adapted to be firmly secured or locked together. This rear member 6 is also provided internally at its breech end with a screw-thread, whereby it is adapted to receive the closing screw-plug 7, which is preferably made of cup-like form, as shown.

The outer tube or jacket, 5, which is to be shrunk onto the inner tube, is formed with such interior dimensions and shape as will adapt it to fit accurately upon the rear member, 6, of said inner tube, being provided with an enlarged front end, which forms a seating-surface, 11, and a shoulder, 10, which bear upon the seating-surface 12 and against the the shoulder 9 of the said rear member, 6, while its extreme end is so shaped as to form a close joint with the rear end of the front member, 4; and its external diameter is the same as that of the front member, 4, so that when fixed in place so as to envelop the rear member, 6, it will in connection therewith practically form a continuation of the front member, 4.

The parts of this compound lining or tube may be locked together in many ways, two forms of such fastening means being illustrated. Thus, as in Fig. 1, the rear member, 6, may be shortened to permit the breech end of the outer tube or jacket, 5, to project beyond it, which projecting end is provided with an internal thread, into which a locking-disk, 13, is screwed, or, as in Fig. 2, the breech end of the outside

tube or jacket, 5, may be provided with a screw-thread, 15, taking into a similar thread on the end of the rear member, 6.

The parts of this compound lining or tube may be assembled as follows: The rear member, 6, after having the plug 7 screwed into its breech end, is inserted from the rear into the outer tube or jacket, 5, care being taken that the shoulder 9 of the one is snugly seated against the shoulder 10 of the other. This operation is effected while outer tube or jacket, 5, is heated, whereby a close and accurate joint between the two is secured by shrinkage, as is well understood. The front member, 4, of the inner tube is then locked to its rear member, 6, and with the outer tube or jacket, 5, by means of the screw-threads 8, under shrinkage being preferred.

If the construction of the locking device be that shown in Fig. 2, the jacket 5 will now be locked to the rear member, 6, by the screw-thread 15; but if the construction be that shown in Fig. 1 the next operation will be to screw the locking-disk 13 in place. The compound tube is then ready to be inserted into the bore of the gun, where it is secured by the well-known muzzle-collar 14.

In guns heretofore constructed which are provided with compound lining tubes, the outer tube or jacket has been simply shrunk onto the inner tube, thus aiding the latter longitudinally only by the friction resulting between the two, while by locking the said parts securely together, as in my improved construction, all the longitudinal strength possessed by both the inner tube and the outer tube or jacket is utilized in resisting the strains exerted by the exploding charge.

When the gun is discharged the developed gases impress upon the base of the bore as well as its sides and on the projectile, and the latter as it passes through the bore, especially when the maximum pressures attain, creates considerable and dangerous strains from friction on the surface of the bore, calling into play the longitudinal strength of the inner tube. This tube, as ordinarily constructed, has in some cases failed to sustain these strains, and has in consequence ruptured and destroyed the gun. This weakness results from faulty construction, and is entirely overcome by my invention, whereby the longitudinal strength of the inner tube is augmented by that of the outer tube or jacket, 5, by locking the two together. Thus the projectile in its passage throws a powerful longitudinal strain on the inner tube, which, when the maximum strains are reached, transmits the thrust onto the shoulder 9, which, in its turn, transmits it to the outer tube or jacket, 5, which, being secured at the base by the locking-disk 13 or screw-thread 15, is drawn upon for its longitudinal strength.

By locking the parts of the compound lining or tube together a structure is obtained which will successfully sustain any strains resulting from a proper charge.

What, therefore, I claim is—

1. The inner tube, constructed of two sections or members, as 4 and 6, mechanically united together, substantially as described.

2. The combination of the two sections or members 4 6, constituting the inner tube, with the outer tube or jacket, 5, substantially as described.

3. The combination of the section or member 6 of the inner tube, having a shoulder, 9, with the outer tube or jacket, 5, having a shoulder, 10, the said parts being provided at their breech ends with a means for securing them in their longitudinal relation, substantially as described.

4. A compound lining for ordnance consisting of, first, an inner tube formed in two sections or members, 4 6, the member 4 of which is provided with a shoulder, 9; second, an outer tube or jacket, 5, provided with a shoulder, 10; and, third, of a disk, 13, the said parts being combined and operating substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

S. CRISPIN.

Witnesses:
CHAS. J. MCGOWAN,
CHAS. H. CAMPBELL.