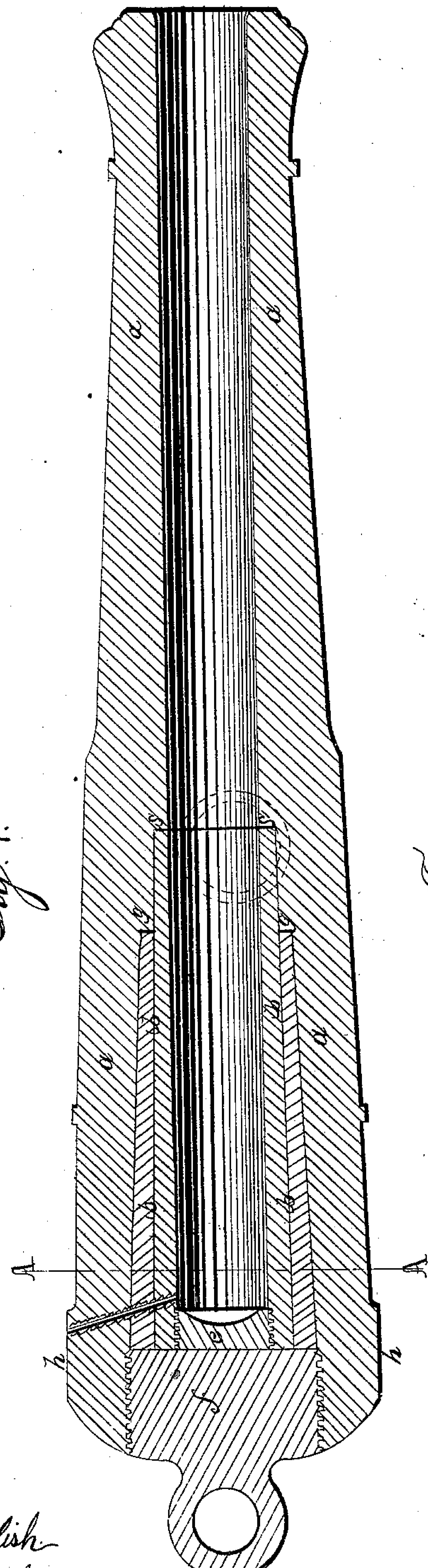
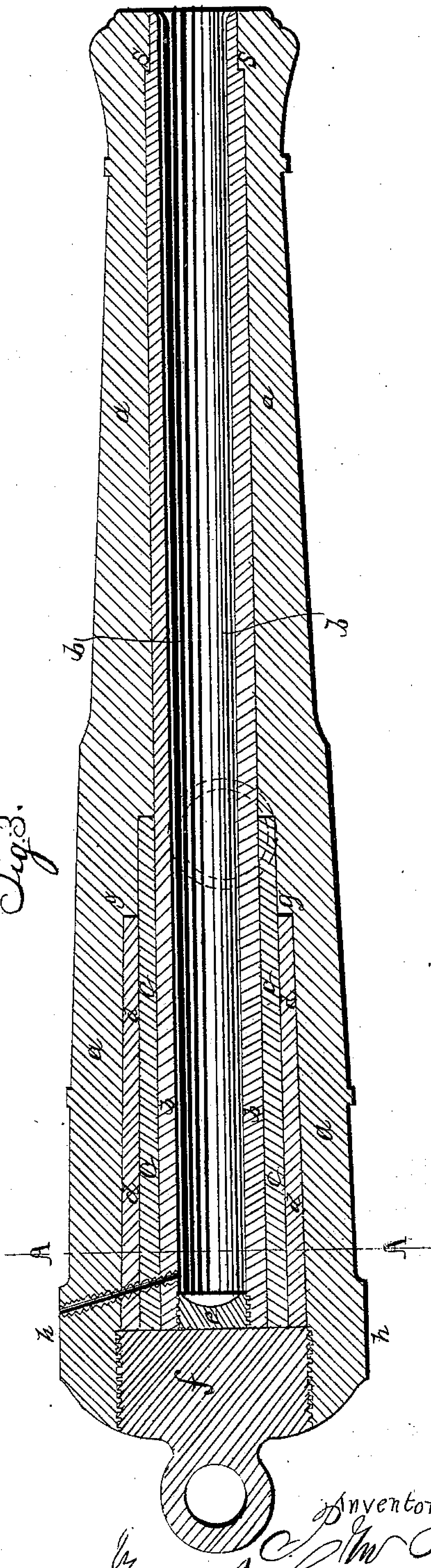
2 Sheets—Sheet 1.

P. M. PARSONS.

Muzzle-Loading Ordnance.

No. 43,629 Patented July 19, 1864.





Witnesses
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J. L. Coombs.

Inventor.
P. M. Parsons
by E. A. Brown his atty

2 Sheets—Sheet 2.

P. M. PARSONS.

Muzzle-Loading Ordnance.

No. 43,629. Patented July 19, 1864.

Fig. 6.

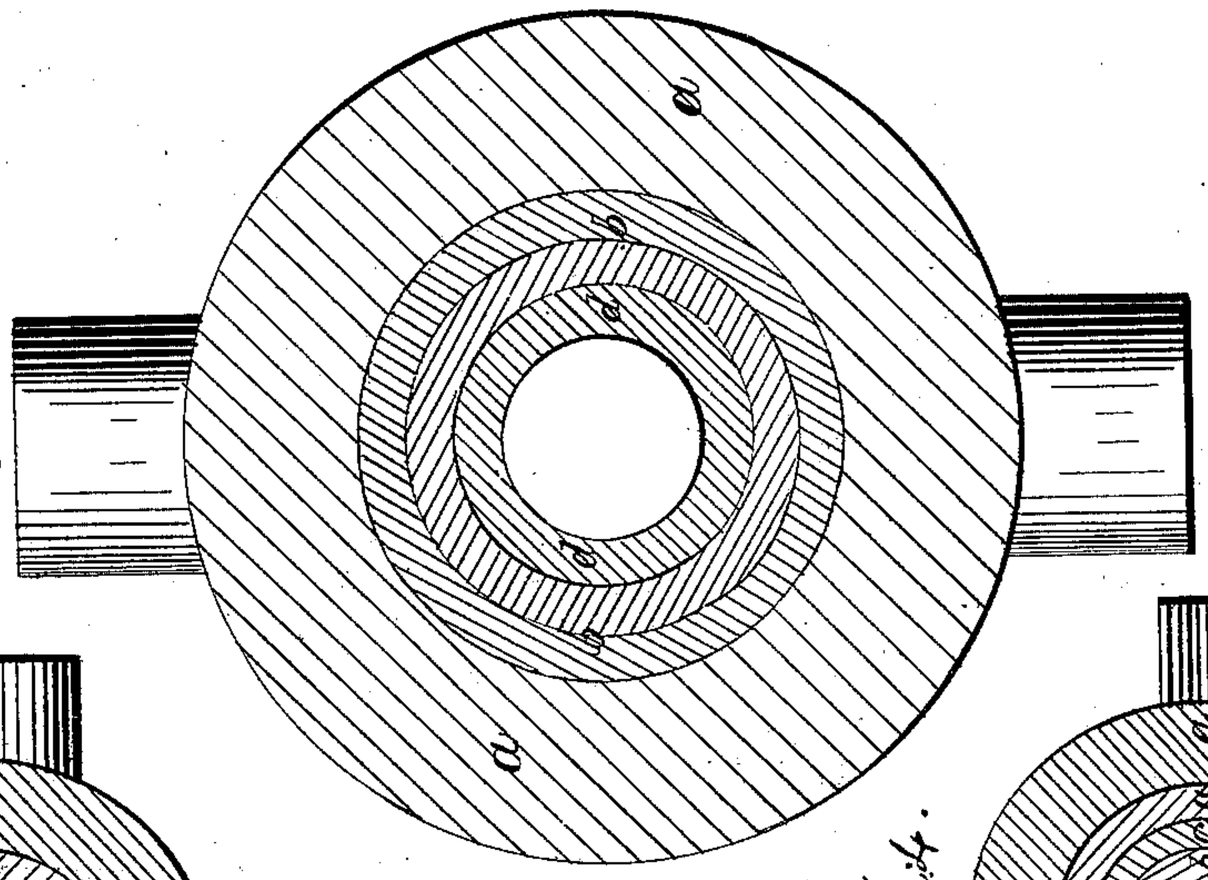


Fig. 2.

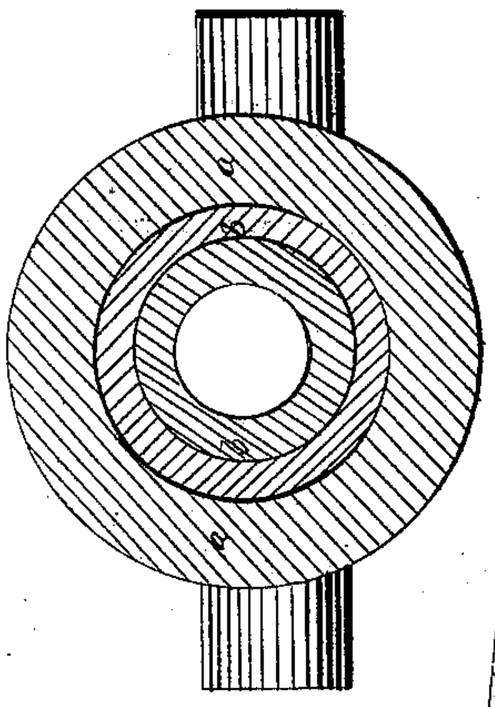


Fig. 4.

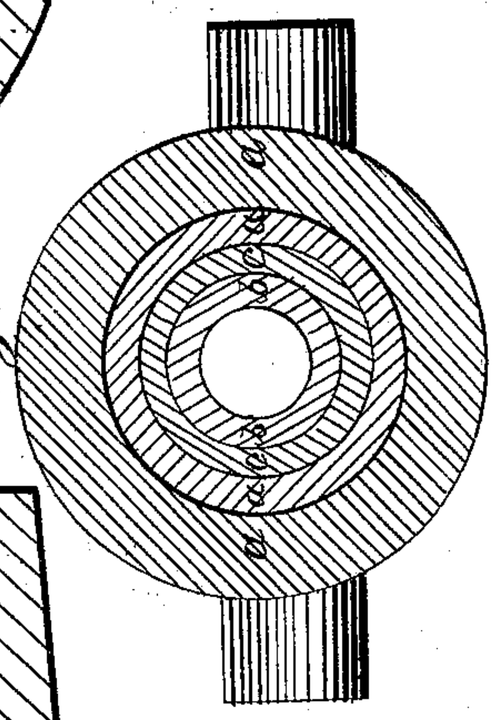
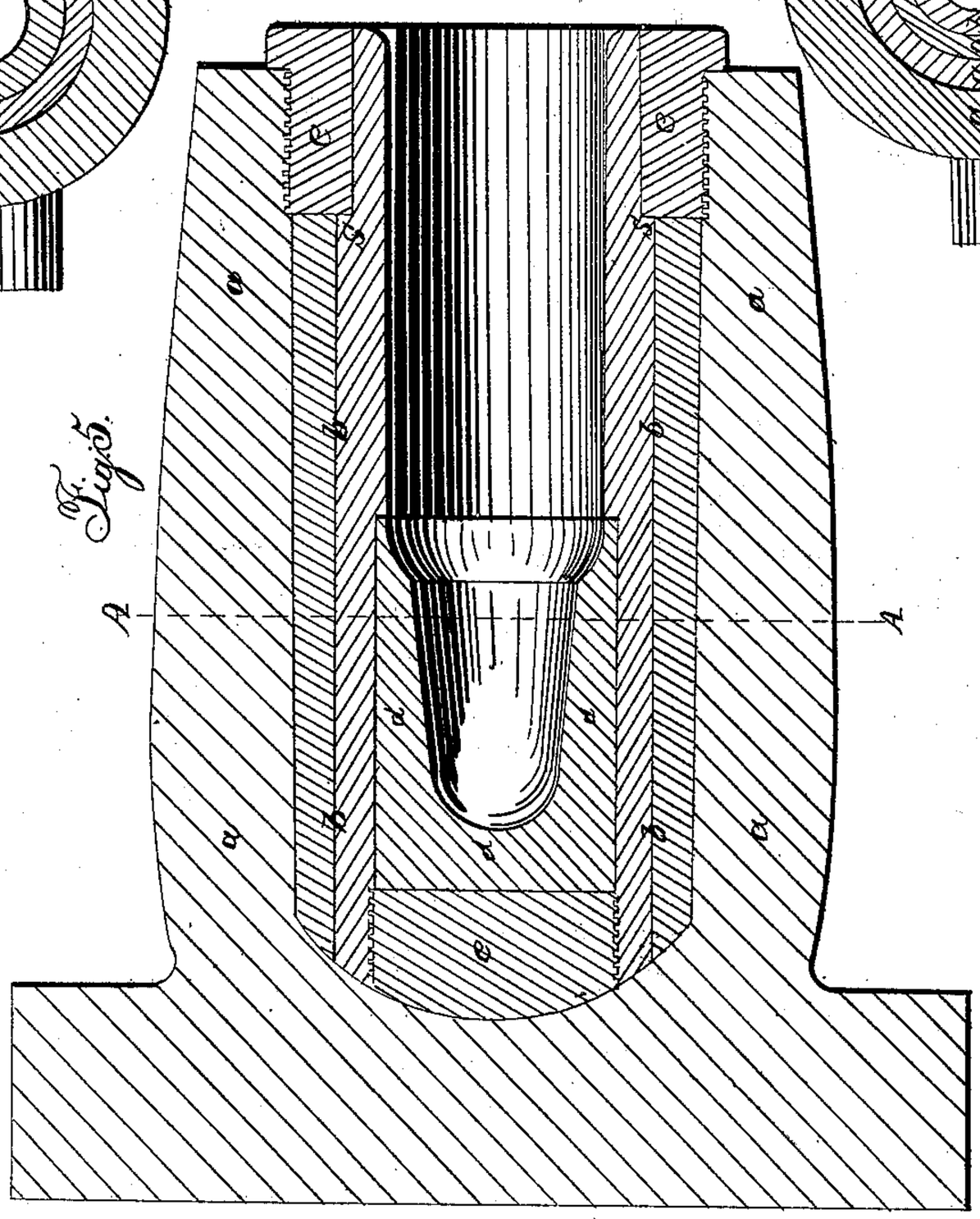


Fig. 5.



Witnesses.

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J. L. Coombs

P. M. Parsons
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UNITED STATES PATENT OFFICE.

PERCEVAL MOSES PARSONS, OF BLACKHEATH, COUNTY OF KENT, ENGLAND.

IMPROVEMENT IN STRENGTHENING ORDNANCE.

Specification forming part of Letters Patent No. 43,629, dated July 19, 1864.

To all whom it may concern:

Be it known that I, PERCEVAL MOSES PARSONS, of Blackheath, in the county of Kent, England, civil engineer, have invented Improvements in Ordnance and in Rifling the Same and other Fire-Arms; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the figures and letters marked thereon.

My invention consists of certain methods of constructing ordnance, the object of which is to enable guns to be made of larger caliber and greater strength than can be obtained by the methods of construction now in use. For this purpose I form the body of the gun of cast-iron, and I bore out a recess, by preference of a conical form at the breech end of the gun, larger in diameter than the intended finished size of the bore, but extending only a portion of its length, and I fit into the recess a tube of wrought-iron, steel, homogeneous metal, or other suitable material, accurately turned to the shape and size of the recess, and secure it by a breech-plug screwed into the breech of the gun if a muzzle-loading gun, or by a hollow screw if a breech-loader. The tube may be in one piece of metal, or built up of several, either by fitting two or more rings together or by shrinking, forcing, or screwing one or more tubes or rings onto an inner tube or tubes.

Figure 1 is a longitudinal section, and Fig. 2 a cross-section at A A, Fig. 1, of a gun constructed on this system. *a a* is the body of the gun, made of cast-iron. *b b* is the tube, of wrought-iron, steel, or homogeneous metal, let into the conical recess at the breech end of the gun *a a*, and secured therein by the breech-plug *f*. The tube is in this case composed of two layers, as shown, the outer one being intended to be shrunk, forced, screwed, or fitted onto the inner one. The tube has a breech-plug, *e*, of its own, in addition to the breech-plug *f*, which secures it in its place. I consider this desirable, in order to prevent the explosive gases from getting between the end of the tube and the breech-plug *f* which secures it, and by acting on its larger area, endangering its security; or the tube may, if preferred, be made with a solid end. I have not thought it requisite to show a hollow screw for a breech-loader, as its form and size must depend entirely on the description of breech-loading arrangement used; but its application when required will be understood by those acquainted with the construction of guns of this description. In some cases I apply a tube of the description before named in combination with a tube of wrought-iron, steel, homogeneous metal, or other suitable material with which the gun is lined throughout the whole length of the bore.

Fig. 3 is a longitudinal section, and Fig. 4 a cross-section at A A, Fig. 3, of a gun so constructed. *a a* is the body of the gun. *b b* is the tube with which the gun is lined throughout. *c c* and *d d* are the tubes applied at the breech end; *e*, the tube-plug, and *f* the breech-plug, which secures the lining-tube in its place. In constructing a gun of this description, I should first prepare the inner tube by turning it slightly conical and shrinking onto its breech end the tube *c c*, and onto that the tube *d d*, both being carefully turned, and their sizes properly adjusted. The interior of the gun being then bored out to a corresponding shape and size, the tube is inserted and secured by screwing in the breech-screw *f*. The degree of tightness with which the internal tube is made to fit must depend on circumstances and the nature of the material used for the tube, as well as on the quality of the cast-iron, in reference to the amount of elongation each will bear before exceeding its elastic limit, as well as the proportionate sizes of each, and therefore no precise instructions can be given on this point, but the degree of force with which the sides of the lining-tube are pressed against the sides of the cast-iron casing should be regulated so as to give to each its proportionate share of work, or, in other words, so that the extension of each, when under the strain of the discharge, would bear about a relative proportion to that of its elastic limit, and, if anything, I should be inclined to favor the cast-iron, its character being more uncertain than wrought-iron or steel. As a general rule, taking into consideration that wrought-iron will admit of more than double the extension of cast-iron in the same unit of length without straining it beyond its elastic limit, I consider that a fair fit, without much pressure, will be found to effect the object intended. It is, however, essential that the end of the lining-tube *b b*, Fig. 1, should bear well

against the shoulder or end of the recess at *s*, into which it is fitted, and against the force of the breech-screw *f*, so that, being compressed between the shoulder at one end and the breech-screw at the other, any strain thrown on the lining-tube *b b*, tending to elongate it, will be transferred to and resisted by the cast-iron body of the gun. For the same reason, when a lining-tube is used extending the whole length of the gun, it should be turned down smaller at the muzzle end, so as to form a shoulder to bear against the shoulder or end of the recess made in the body of the gun for its reception, as shown at *s' s'*, Fig. 3.

For the purpose of insuring an equal longitudinal extension of the cast-iron surrounding the lining-tube at the re-enforce, I so arrange the diameters at that part that the area of its transverse section will be as nearly as possible the same throughout the length between the screw *f* and the shoulder *g*, or for a sufficient portion of that length; and I increase the diameter of the part surrounding the screw *f*, as shown at *h*, so that the area of its cross-section will be at least equal to the area of the largest part between the breech-screw *f* and the shoulder *g*, by which means the extension due to the longitudinal strain will be equally distributed, and the metal throughout will in consequence be less liable to rupture than if one part were of less area and more strained than another.

In applying this system to mortars, the recess may be bored out and the tube inserted from the muzzle end, and the screw which secures the lining-tube in its place is then made hollow, and is screwed into the muzzle in such a manner that it will bear against the end of the tube, or on a shoulder made on it for that purpose, and produce the effect before described in confining it longitudinally.

Fig. 5 is a horizontal section, and Fig. 6 a cross-section at A A, Fig. 5, of a mortar made according to my invention, showing this modification. *a* is the body of the mortar, made of cast-iron; *b*, the lining-tube, made of wrought-iron or steel, or of the two combined; *b*, the screw which is screwed into the mouth of the mortar, holds the lining-tube *b* in its place, and confines it longitudinally by bearing against shoulder *s*. The breech of the lining-tube *d* is made solid; or it may be plugged up by a screw, and it is further secured by the screw *e* behind it screwed into the lining-tube. This method of inserting and securing the lining-tube may also, in some cases, be applied to guns—that is, when their form admits of a tube of the requisite size being inserted without too much reducing the thickness of the metal at the muzzle—and it will be seen that the same effect is produced as that before described—videlicet, that the lining-tube being confined between the screw *c* at one end and the breech of the gun or mortar at the other, the longitudinal strength of the cast-iron is imparted to it and assists in resisting the strain tending to elongate it.

In some cases, in order to strengthen the connection between the lining-tube and the body of the gun or mortar, the exterior of the lining-tube may have a screw-thread cut on the whole or a part or parts of its length, and be screwed into the interior of the gun, having a corresponding female screw cut on its interior, and the screw for securing the lining-tube in its place, before described, may be used in combination therewith, or in some cases dispensed with altogether. By these hereinbefore-described arrangements a wrought-iron or steel tube of small thickness will be found to add greatly to the transverse strength of the gun, and the recess to receive it being taken out of the center the sectional area of the body of the gun is so slightly reduced that it will still possess ample longitudinal strength to support the lining-tube, by which combination guns may be made of great strength at moderate cost, and existing cast-iron guns may be greatly strengthened.

Having now fully described my invention, I would observe that I am aware that it has been proposed to line cast-iron guns with tubes, and to this of itself I lay no claim; but

I claim as my invention—

Constructing cast-iron guns with and applying to them internal tubes of wrought-iron, steel, homogeneous metal, or other suitable material inserted at the breech end, into a suitable recess, and secured therein by a screw or screws, and so arranging the dimensions of the cast-iron surrounding the lining-tube at the re-enforce that it may be subjected to an equal or nearly equal longitudinal strain or extension throughout a sufficient length of the same, and the general combinations by which the longitudinal strength of the cast-iron body of the gun or mortar is imparted to and supports the lining-tube, while it absorbs or relieves the cast-iron of a portion of the transverse or circumferential strain, as hereinbefore described.

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