2 Sheets—Sheet 1.

W. PALLISER.

Compound Ordnance.

No. 196,695. Patented Oct. 30, 1877.

FIG: 1.

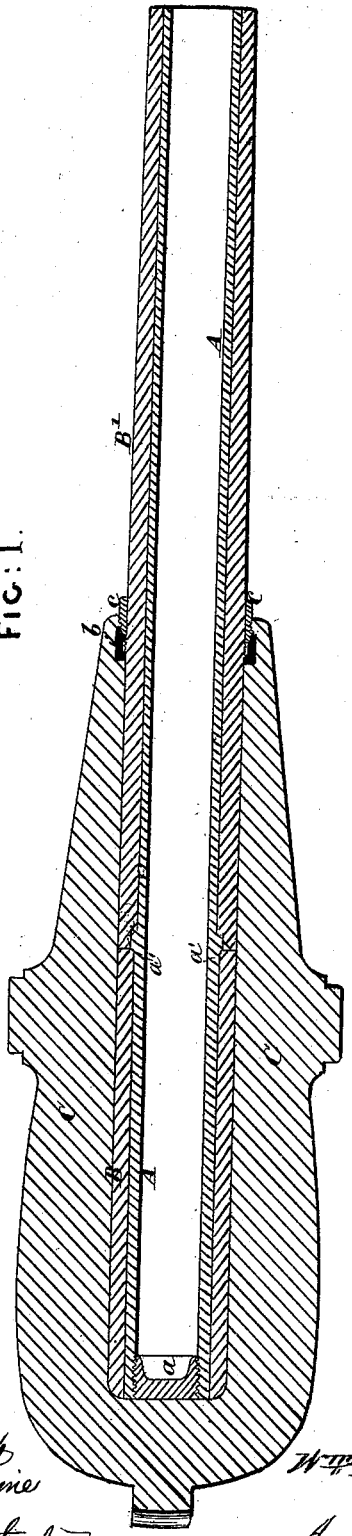
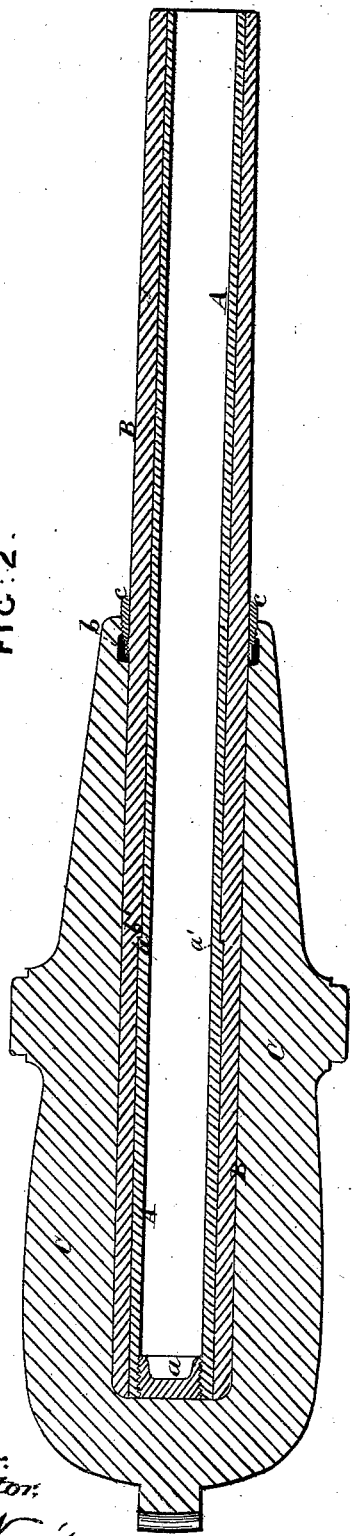


FIG: 2.



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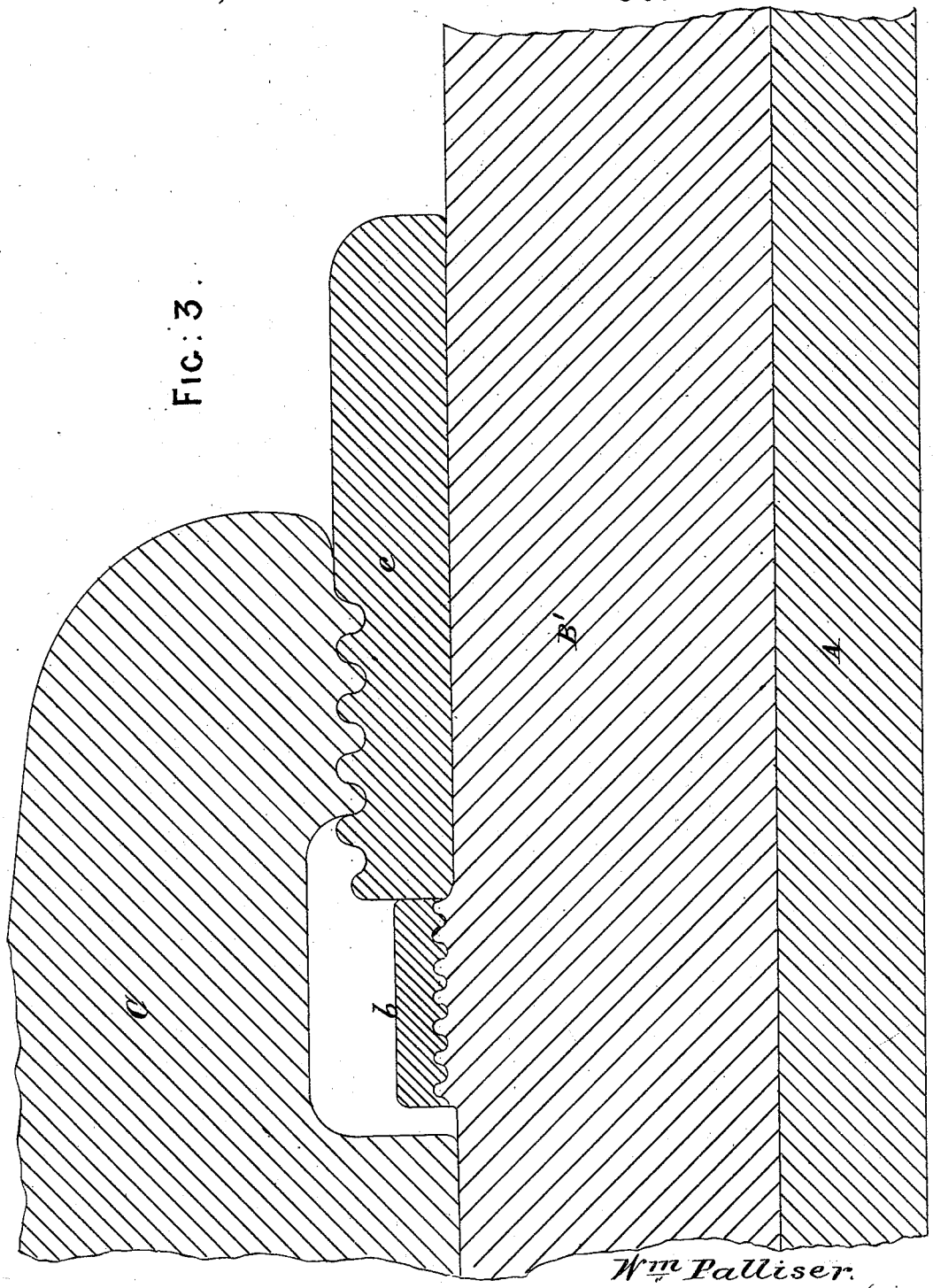
2 Sheets—Sheet 2.

W. PALLISER.

Compound Ordnance.

No. 196,695. **Patented Oct. 30, 1877.**

FIG. 3.



Wm Palliser.
Inventor.

Attest:
H. C. Perrine
J. A. Rutherford

By. James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM PALLISER, OF LONDON, ENGLAND.

IMPROVEMENT IN COMPOUND ORDNANCE.

Specification forming part of Letters Patent No. **196,695**, dated October 30, 1877; application filed October 15, 1877.

To all whom it may concern:

Be it known that I, WILLIAM PALLISER, of No. 19 Earl's Court Square, London, in the county of Middlesex, England, knight, have invented an Improved Composite Gun; and do hereby declare that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvement, by which my invention may be distinguished from others of a similar class, together with such parts as I claim and desire to secure by Letters Patent—that is to say:

My invention relates to the construction of composite guns, particularly guns of large caliber, in such a manner as to obtain great strength and inertia at moderate cost. For this purpose I construct a gun in three main parts—first, a coiled wrought-iron inner or A tube, which is closed at its breech end by a plug screwed into it; secondly, a coiled wrought-iron outer or B tube, fitting over and inclosing the whole length of the A tube; and, thirdly, a heavy cast-iron breech-casing, which has a solid breech and cascabel, and extends forward over somewhat more than half the length of the barrel, being provided at the front end with a screw-ring, which bears against a shoulder on the B tube.

The B tube is shrunk on the A tube; and, to facilitate this in the case of long guns, the interior of the B tube and the exterior of the A tube may be slightly tapered. I prefer to make the B tube of two separate lengths, making the length at the breech end considerably thicker than the other length, the A tube being made proportionately thinner at the breech end. In this case the exterior of the A tube is tapered in opposite directions from the point where the two lengths of the B tube meet, which are tapered internally in a corresponding manner, so that each length can be slid onto the A tube from opposite ends.

At the point of junction of the two lengths of B tube I form on the A tube a collar, against which the outer length of the B tube bears, in order to impart longitudinal strength to the breech end of the A tube. If the B tube is made in one continuous length, the breech end of the A tube is made slightly thicker than the muzzle end, thus forming a collar or shoulder at the junction of the two thicknesses, against which an interior shoulder on the B tube bears, the breech end of this tube being of enlarged inner diameter, so as to fit the enlarged outer diameter of the A tube.

The breech-casing is cast hollow and bored; or it may be merely lapped or ground out to form an easy fit over the B tube, which is pushed into it, a small vent for the escape of air having been previously bored through the breech of the casing.

Figure 1 of the accompanying drawings shows a longitudinal section of a composite gun constructed according to my invention, the B tube being, in this case, formed in two separate lengths, as described.

A is the inner coiled wrought-iron tube, closed at the breech by the screw-plug *a*, for which is provided a thread projecting internally in the A tube, so that the latter is not weakened by cutting the thread into its substance.

B B′ are the two lengths of the outer coiled wrought-iron tube, which are shrunk on the A tube, the latter being provided with a collar or shoulder, *a′*, at their junction, against which the tube B′ is made to bear. From this point the outer surface of the A tube is tapered in contrary directions toward each end, the breech part being made thinner than the muzzle part, as shown, while the part B of the outer tube is made correspondingly thicker than the part B′. The latter is secured in the cast-iron breech-casing C by the ring *c*, screwed into it, and pressing against the collar *b*, formed or screwed on the tube B′. I prefer to screw this collar onto a raised thread on the tube, as shown more clearly at the enlarged detail of this part of the gun at Fig. 3, as, if the collar were formed on the tube, it would be necessary to forge this of considerable thickness. The raised thread is made of sufficient length to afford the requisite bearing-surface to take the thrust, and it should run in the contrary direction to that of the ring *c*; or the collar *b* should be prevented from turning by means of a pin or other well-known device. From the collar *b* the tube B′ is tapered in thickness externally toward the muzzle end, as shown. It should be made to bear well against the collar or shoulder *a′* of

the A tube, in order to impart longitudinal strength to the thin breech end of the latter. This is effected by the screw-ring *c*, which presses B′ against the collar *a′*. If the tube B′ is warmed and shrunk over the A tube, the former, when cold, will be in a state of longitudinal tension, as well as circumferential tension, and when the first shot is fired the tube B′ will contract longitudinally. Owing, however, to the pressure put upon B′ by the screw-ring *c* in the direction toward the breech end, the entire longitudinal contraction will take place in that direction, and consequently B′ will be prevented from shrinking away from the collar *a′*.

The cast-iron casing has the end face formed perpendicular to the tube B′, in order to give strength to resist any tendency of the casing to begin to split at that point; and its inner edge, where the ring *c* screws into it, should be rounded off, as shown at Fig. 3. It should also be well hollowed out behind the thread, as shown, so as to make the front part, in which the screw-thread is cut, stronger than the part immediately behind it, and thus insure that there shall be no tendency to fracture at that front end. The casing is cast hollow, and bored or ground out, to fit over the tubes B B′.

Fig. 2 shows a longitudinal section of the modification of the gun, wherein the B tube is constructed of one entire length, suitable for guns of smaller caliber than that for which the design Fig. 1 is intended. The only difference between the two constructions is that in this case the breech end of the A tube is formed of enlarged external diameter instead of being made thinner, the interior diameter of the breech end of B being also correspondingly enlarged, thus forming a shoulder at *b′*, which is pressed against the shoulder *a′* of A by means of the screw-ring *c*, in precisely the same manner as described with reference to Fig. 1.

For guns of large caliber I prefer to use the construction shown in Fig. 1, because, by making the breech end of the A tube comparatively thin, sound welds are insured, and should it crack or the welds open, the fissure is prevented from extending in depth so as to become dangerous to the safety of the gun.

Having thus described the nature of my said invention, and the best means I am acquainted with for carrying it out in practice, I claim—

1. A composite gun consisting of a coiled wrought-iron A tube, of a coiled wrought-iron B tube (in one length or in two separate lengths) shrunk thereon, and of a heavy cast-iron breech-casing, C, stopping short at some distance from the muzzle, and holding the B tube by means of a screw-collar, *c*, substantially as herein described.

2. In composite guns constructed according to the first claim, the collar or shoulder *a′* on the A tube, operating in combination with a shoulder on the B tube, the collar *b*, and screw-ring *c*, for affording longitudinal support to the breech end of the A tube, substantially as herein described.

3. A composite gun consisting of a coiled wrought-iron A tube, of a coiled wrought-iron B tube (in one length or in two separate lengths) shrunk thereon, and of a heavy cast-iron breech-casing, C, the B tube being made to press against a shoulder on the A tube by means of a screw-ring, *c*, screwed into the casing C, and bearing against a collar on the B tube, substantially as and for the purposes herein described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 28th day of September, 1877.

WILLIAM PALLISER.

Witnesses:
JNO. P. M. MILLARD,
CHAS. BERKLEY HARRIS.