J. G. BUTLER.

Ordnance.

No. 163,149. Patented May 11, 1875.

FIG. I.

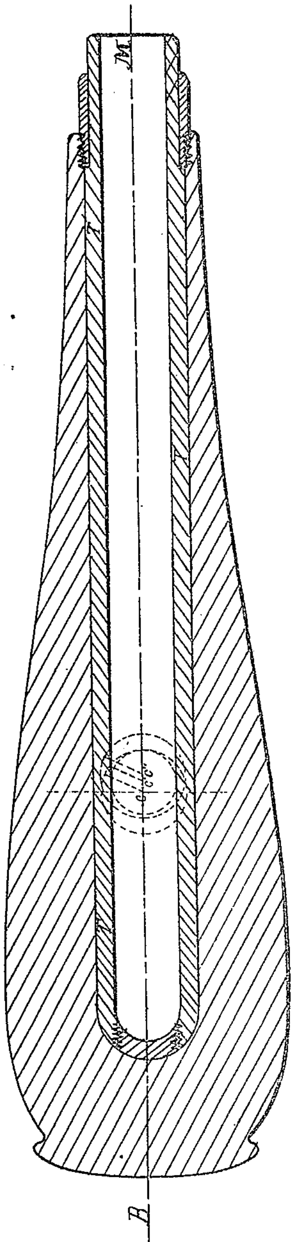
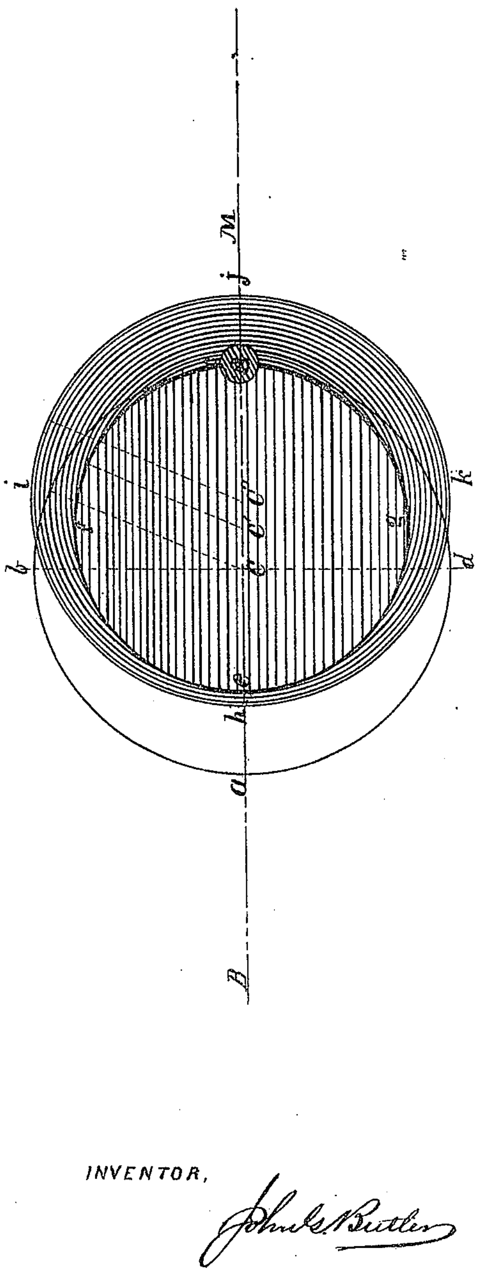


FIG. II.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN ORDNANCE.

Specification forming part of Letters Patent No. 163,149, dated May 11, 1875; application filed March 18, 1875.

To all whom it may concern:

Be it known that I, JOHN G. BUTLER, of the city of New York, county and State of New York, have invented certain Improvements in Ordnance, of which the following is a specification, reference being had to the accompanying drawings.

In the original construction of cannon it is an easy matter to so adjust the position of their trunnions that the gun will be evenly balanced thereon, or, if it be desired, any amount of preponderance can be secured. In the case, however, of smooth-bore guns which it may be desired to convert into rifles by the the insertion of rifled tubes, if we suppose the guns to have been originally balanced upon their trunnions, the process of conversion to a smaller caliber must necessarily shift the position of the center of gravity to the front of the trunnions, and thereby cause a muzzle preponderance, or, speaking with reference to the breech, a counter-preponderance, which is highly objectionable, and an awkward impediment to the proper serving of the gun. This difficulty is of course caused from the fact that that portion of the tube in front of the trunnions is much longer and therefore heavier than the part back of the trunnions; and in case of any lengthening of the gun by the extension of the tube in front of the original muzzle, the counter-preponderance is largely increased. It is the object of my invention to remedy this defect in converted guns.

Figure 1 represents, in outline, a longitudinal section of a ten-inch Rodman smooth-bore gun after conversion into a rifle of lesser caliber.

If we suppose the original gun to have been balanced accurately upon its trunnions—that is, if the center of gravity of the gun lay in the axis of the trunnions—then it is obvious, without demonstration, that after the insertion of the tube T, the center of gravity of the entire system is shifted toward the front, and the muzzle of the gun must, therefore, "dip," because the axis of the trunnions remains unchanged. Suppose, however, that shift forward the axis of the trunnions in same degree that the center of gravity been disturbed; it is clear that by so doing the equilibrium of the gun about its trunnions will be restored. My invention accomplishes this useful end.

Turning from Fig. I, which is too small to be well adapted to the purpose of clear explanation, I refer to Fig. II, where *a b c d* represent, on a greatly-increased scale, the circumference of one of the trunnions of the gun shown in Fig. I. The line B M shows the axis of the bore, B being toward the breech, and M toward the muzzle. C is the center of the trunnion, which in diameter is the same as the caliber of the original gun.

When the gun has been converted into a rifle by the insertion of the necessary tube, we will suppose that the position of the center of gravity has been shifted from C to C″. The problem presented is to place the axis of the trunnions supporting the piece at this same point. Owing to the superfluous strength of the trunnions of guns of the army pattern I am enabled to do this by reducing the diameter of the trunnions in such a manner (eccentrically) as to place the center of the new and reduced trunnions at C′, thus gaining that much of the desired distance; and then encircling this reduced trunnion with an eccentric ring, the thicker portion of which is toward the muzzle, the center of the whole (now compound) trunnion may be placed at the desired point C″, and the gun thus re-established in equilibrium upon its supports.

In Fig. II, *a b c d* represent the circumference and C the center of the original gun, which is, say, ten inches in diameter, or the same as the caliber of the gun before conversion; *e f c g* represent the circumference and C′ the center of the trunnion after being reduced to eight inches diameter, or the same as the caliber of the gun after conversion; and *h i j k* is the eccentric collar placed over the reduced trunnion in such a manner that the center of the whole is at C″, and the trunnion restored to its original diameter, thus accommodating the gun to its original carriage, and dispensing with any alteration of the latter. The eccentric ring or collar *h i j k* may be either shrunk upon, screwed, or forced over the trunnion, and should afterward be held in position by a pin or spline, S. Of

course both trunnions are altered in the same manner. The eccentric collar may be of brass or bronze, though preferably of wrought-iron. The latter metal is indicated in the drawing, the shading lines being in the direction of the fiber.

It is clear that if the trunnions of any converted gun be too small to admit of reduction in diameter, the eccentric collar may nevertheless be applied with good effect; but in this case the trunnion-beds of the gun-carriage would have to be altered to suit the increased diameter of the trunnions. Also, it is apparent that if the reduction of the trunnions alone will secure sufficient change of axis, the eccentric collar may be dispensed with, and the trunnion-beds of the gun-carriage reduced to suit the trunnions, by filling up with a metal collar.

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

1. The eccentric trunnion-collars *h i j k* applied either to trunnions of full or reduced diameter, substantially as and for the purpose hereinbefore set forth.

2. The method of preserving or restoring the equilibrium of ordnance by eccentrically changing the trunnions, and thereby changing the centers thereof to correspond to the center of gravity, substantially as described.

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