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G. S. MAXWELL

MUZZLE LOADED MORTAR

Filed May 12, 1925

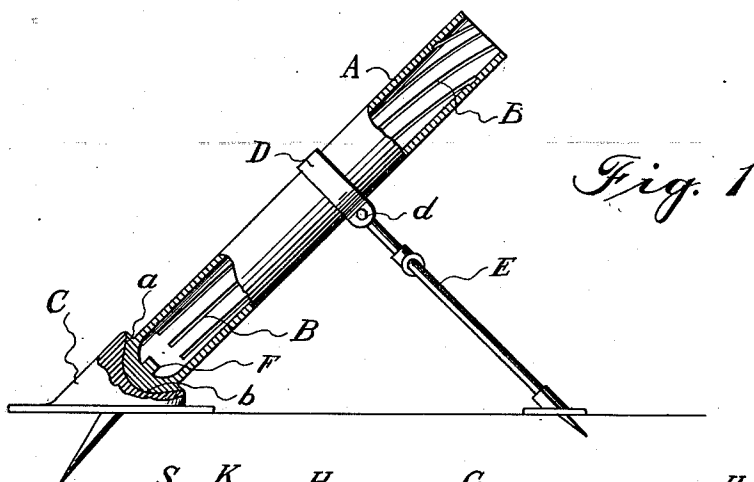


Fig. 1

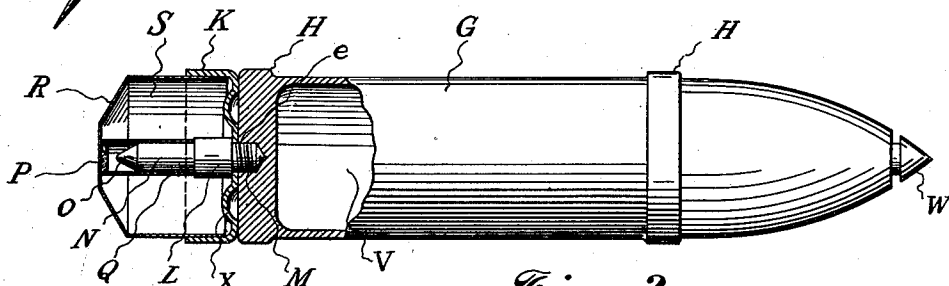


Fig. 2

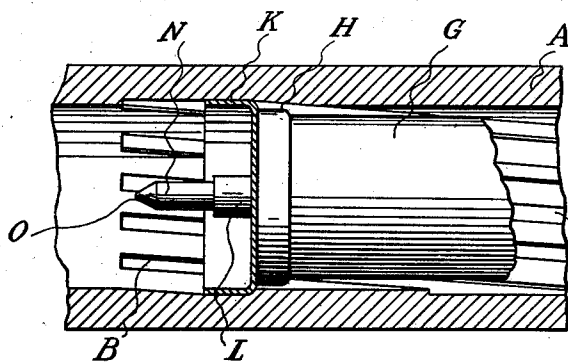


Fig. 3

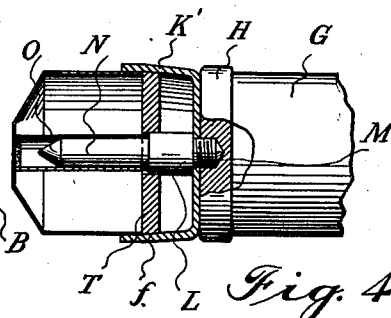


Fig. 4

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UNITED STATES PATENT OFFICE.

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MUZZLE-LOADED MORTAR.

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My invention relates to improvements in muzzle loading mortars of the artillery type, and has for its object extreme rapidity of fire, greater accuracy and longer ranges than can be secured with the existing types of muzzle loading mortars.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, the invention consists in the method and in the means hereinafter particularly described, and then sought to be clearly defined by the claims, reference being had to the accompanying drawings forming a part hereof, and in which—

Figure 1 is an assembly view of a side elevation of the mortar partly in section, showing one manner of mounting, and the rifled barrel;

Figure 2 is a side elevation of the projectile partly in section, used with the mortar and illustrates the method of securing rotation by means of an expansible rifle band, and also the propellant charge and its primer mounted on the base of the projectile;

Figure 3 is an enlarged view of the expansible rifle band, partly in section; also of the mortar and projectile, with parts broken away;

Figure 4 is a view of an alternate or modified form of rifle band, partly in section.

I am aware that muzzle loaded mortars or guns with rifled barrels and using projectiles with expansible rifle bands have heretofore been used, these mortars or guns however, used a separately loaded propellant and primer which were fired by means external to the barrel. The projectile was also seated in place by means of a ramrod instead of being seated and fired by means of its own weight as in my invention.

I am also aware that smooth bore mortars using projectiles supporting the propellant charge and its primer have been constructed and that the propellant charge and its primer, carried by the projectile, were fired by means of the weight of the projectile.

This type of mortar is, however, limited in its range, owing to lack of stability and the tumbling of its projectile. The greatest range of the 4" Stokes mortar, which is typical of this type of smooth bore mortar is 1030 yards, while a mortar embodying my invention, and using the same powder

charge as the 4" Stokes mortar, gives an increase in range over the smooth bore of over 163 per cent with greatly increased accuracy of fire at all ranges.

I am not aware, however, that a muzzle loaded mortar provided with a rifled barrel into which a projectile, provided with an expansible rifle band and carrying its propellant charge and primer, can be loaded and that thereafter the primer will be detonated and the propellant charge exploded by means of the weight of the projectile with the result that the rifle band is expanded into the grooves of the rifled barrel to secure rotation of the projectile at the same instant that the projectile is driven forward in the barrel of the mortar, has ever been constructed prior to my invention.

In the operation of my invention the barrel of the mortar is supported in any suitable manner, on a base plate, spade or other mounting that allows the barrel to be placed at such an angle with the horizontal that a projectile inserted into its muzzle will fall or slide from the muzzle to the breech of the barrel by means of its own weight.

A projectile having an expansible rifle band attached to the rear end of its body and carrying a propellant charge and its primer supported on a primer firing pin attached to the base of the projectile, is inserted into the muzzle of the mortar and allowed to slide by its own weight to the breech of the barrel. At the instant the projectile reaches the limit of its downward travel in the barrel the firing pin on the base of the projectile strikes against the primer and compressing it against the breech of the mortar causes it to detonate and ignite the propellant charge.

The ignition and explosion of the propellant charge instantly produces a high pressure in the propellant chamber of the mortar and this pressure acting against the expansible portion of the rifle band forces it into the grooves of the rifling and continuing its pressure against the rifle band forces it, and the projectile, to which it is attached, forward, at the same time that rotation is transmitted from the expanded rotating rifle band to the body of the projectile to rotate and thus stabilize it during its flight.

In my invention, great rapidity of accurate firing at any range within the capacity of the mortar is obtained. The only limit

to rapidity of fire being the time required for the projectile to slide into the barrel from the muzzle to the breech, plus the fraction of a second necessary for the exploded propellant charge gases to drive the projectile from the muzzle of the mortar. In actual firings as many as thirty rounds per minute have been secured when using projectiles weighing 25 pounds each.

- 10 The most important feature of my invention, however, is the novel combination of a rifled barrel and rotating means attached to the projectile with a fixed propellant charge and its primer mounted on the base of the projectile and adapted to be fired by means of the weight of the projectile.

Referring to the accompanying drawing:—

- In Figure 1, A is the barrel of the mortar, 20 B the internal rifling in the barrel, C is a base plate provided with a receptacle *a* for the rounded breech, *b*, of the barrel. D is a collar clamped to the barrel that pivotally engages the biped E at *d*, and F is a pin or stud inside the breech *b* against which the primer of the propellant container may strike when the projectile reaches the breech of the barrel.

- Means for elevating or traversing the barrel are not shown, as they do not constitute part of my invention.

- In Figure 2, the projectile body G is provided at either end with an annular bearing surface H that is of greater diameter than the projectile G for the purpose of reducing friction between the interior of the barrel A and the projectile.

- K is an expansible rifle band provided with an annular groove X, the arched side of which faces the propellant chamber S. 10 The expansible rifle ring K is secured to the projectile by means of a shoulder *e* on the body L of the firing pin O and the screw M which is integral with the body L of the firing pin O.

- A propellant container R and a centrally located cup Q integral therewith, constructed of nitrotite, celluloid or other semi-flexible inflammable material are fitted to the projectile by means of friction between the 10 outer wall of the propellant container R and the inner surface of the expansible rifle band K, and also by friction between the interior wall of the cup Q and the reduced portion N of the body L of the firing pin O.

- The space S of the propellant container R is filled with any suitable propellant charge. A primer P capable of detonation by means of friction or compression, is cemented in place at the bottom of the cup Q and immediately below the point of the firing pin O where the propellant container is assembled to the projectile. A percussion fuse W is provided at the forward end of the projectile in the usual manner.

In Figure 3, A is a portion of the barrel showing the rifling B. Mounted in the barrel A the rear end of a projectile G, H, is shown with its attached rifle band K expanded into the rifling B as the result of pressure exerted by the explosion of the propellant charge. 70

In Figure 4, a driving disc T provided with a tapered edge *f* is mounted in the interior of the rifle band K'. This disc T is adapted to be driven forward into the tapered side of the rifle band K' and by wedging action will force the rifle band K' into the rifling B of the barrel A. The disc will be driven forward by the force of the explosion of the propellant in the container. The container R may be practically the same as the container described for the first form described and attached or held in place by friction between the inner wall of the cup Q and the reduced portion of firing pin O. 85

The operation is obvious from the foregoing description; and the advantages over muzzle loaded mortars with rifled barrels in which the projectile is seated by hand-manipulated means and fired by means external to the barrel, and also over smooth bored mortars in which the projectile is fired by means of the weight of the projectile upon reaching its seat by gravitation, are apparent to the skilled in the art in the light of the description given. The embodiment of the two different types or ideas in a single mortar results in attaining greater rapidity of fire, greater accuracy and longer ranges than is possible in a mortar of either one of the two distinct types, due to the modifying influences of one upon the other when employed in conjunction with each other as has been demonstrated in actual practice. 100

I have illustrated and described with particularity the preferred details of the several parts of my invention, but changes can be made without departing from some of the material features and it will also be understood that the form of embodiment of my invention may be changed and essential features of the invention retained. 105

Having described my invention and set forth its merits, what I claim is:— 115

1. In a muzzle loaded mortar, a projectile for the mortar provided with an expansible rifle band, a rifled barrel for gravity feed of the projectile to its seat and engagement of the expansible rifle band with the rifling, a propellant charge mounted on the base of the projectile, a primer for igniting the propellant charge, and means for detonating the primer. 120

2. In a muzzle loaded mortar, a barrel for gravity feed of a projectile to its seat, a projectile for the mortar provided with an expansible rifle band, a propellant charge carried by the projectile and ignitable by impact with the breech of the mortar for 125 130

expelling the projectile and concurrently expanding the expansible rifle band, and means in the barrel for engaging the expansible rifle band and rotating the projectile.

- 5 3. In a muzzle loading mortar, a propellant charge carried by the projectile and ignitable by impact with the breech of the mortar for ejecting a projectile, a primer for igniting the propellant charge, means
10 for igniting the primer, a rifled barrel for receiving the projectile and feeding it by gravity to its seat, and a projectile provided with an expansible rifle band for

engagement with the rifling of the barrel in its ejection progress through the barrel. 15

4. A muzzle loaded mortar with a rifled barrel for gravity feed of a projectile to its seat, a projectile with an expansible rifle band on its base, a propellant charge and primer mounted on the rear end of the projectile, and means carried by the projectile
20 for firing the primer to explode the propellant charge.

In testimony whereof I affix my signature.

GEORGE S. MAXWELL