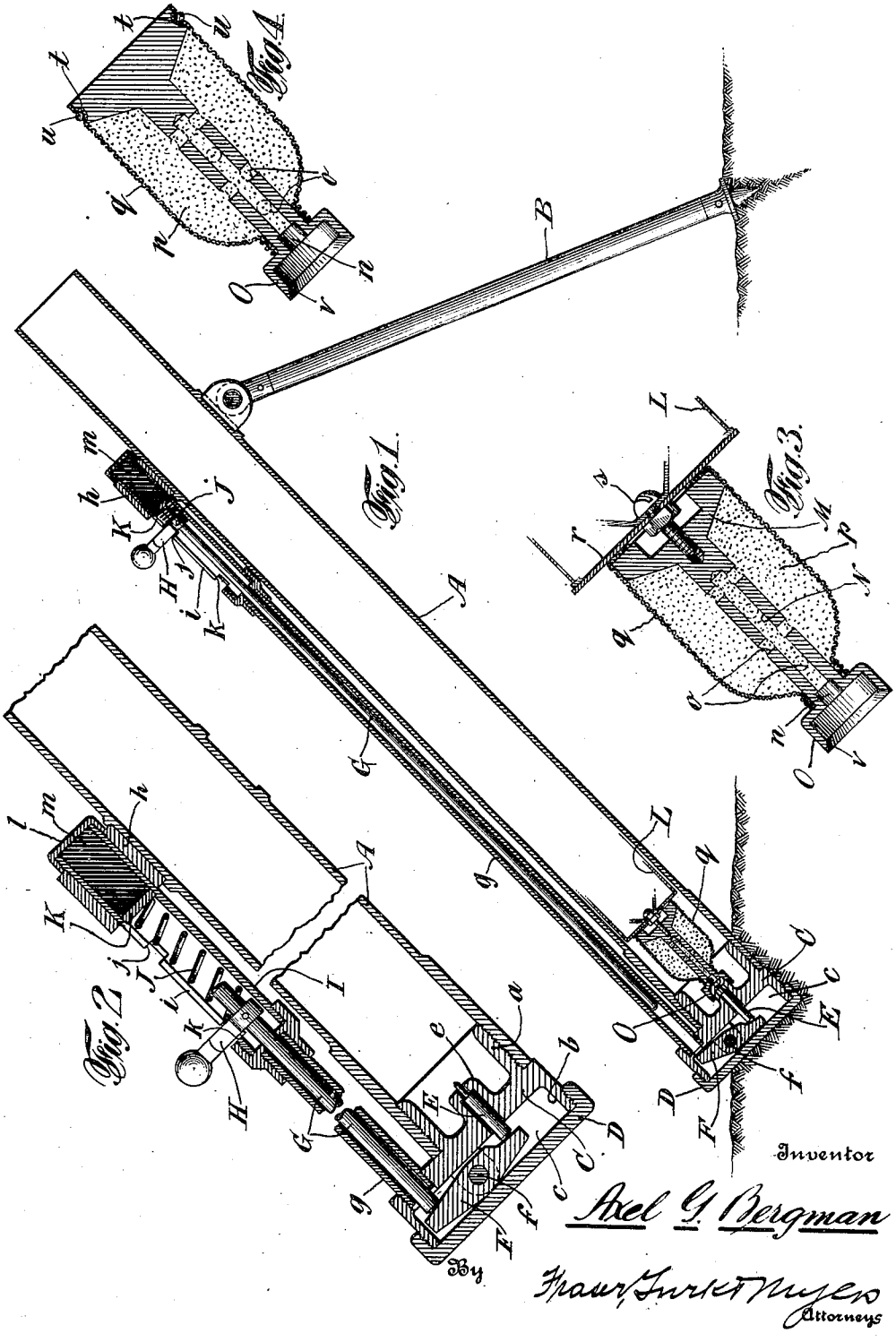
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TRENCH MORTAR.

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UNITED STATES PATENT OFFICE.

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TRENCH-MORTAR.

1,399,243. Specification of Letters Patent. Patented Dec. 6, 1921.

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To all whom it may concern:

Be it known that I, AXEL G. BERGMAN, a subject of the King of Sweden, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Trench-Mortars, of which the following is a specification.

My invention relates to that class of structures known as trench mortars or guns for comparatively short ranges, to be used for discharging illuminating shells and other projectiles, and the purpose is to provide a portable device that can be set up and operated in any location and under most adverse conditions.

One of the purposes of my improvement is to enable positioning a mortar in soft or muddy ground, entirely embedding the rear end if it becomes necessary, and without interfering with the proper control and operation of the mechanism.

Another object of the improvement is to provide means for insuring expulsion of a projectile through the proper and accurate positioning of the primer and propelling charge, which governs the discharge of the projectile, with reference to the firing pin in the mortar.

The invention comprises, in general, a barrel which is entirely closed at the rear end, the latter serving to support a firing pin which forms a part of a firing mechanism that includes an actuating rod located outside the barrel and extending toward the front thereof. The actuating rod referred to is provided with a controlling member located at a point remote from the rear end of the barrel sufficiently to enable setting the rear end on any kind of ground and having it project beneath the surface of the ground if necessary, while the firing mechanism can be adequately manipulated from the front end of the barrel. The firing pin is preferably arranged within a guide that constitutes an extension at the center of the rear end of the barrel, and this extension coöperates with guiding means in the form of a cup-shaped member, or other suitable device, mounted upon a holder for the primer and propelling charge. This holder may be permanently attached to the projectile to be fired, or removably attached, as the conditions may require; severally or together, they may be dropped into the barrel of the gun, convenience in practice seeming to favor the utilization of the shell and propelling charge holder with primer as a unit. This insures proper contact between the firing pin and the primer, and consequently, the discharge of the projectile under most efficient conditions.

To these and other ends the invention consists in certain details and combinations of parts as will be hereinafter more fully described, the essential features of the invention being pointed out in the claims at the end of the specification.

In the drawings,—

Figure 1 is a sectional view, illustrating a mortar in operating position, showing the application of a preferred embodiment of the invention, with the firing pin withdrawn and the firing mechanism ready for action;

Fig. 2 is an enlarged sectional view, with parts broken away, showing the details of the construction;

Fig. 3 is an enlarged sectional view of the holder for the propelling charge and primer, the latter being connected to a projectile, a portion of which is broken away; and

Fig. 4 is an enlarged sectional view of a slightly modified form of holder for the propelling charge, intended for use where it is permanently connected with the projectile.

The invention is susceptible of many different practical applications, and for purposes of illustration, I have shown one embodiment, consisting of a barrel A, provided with the usual form of leg B pivoted thereto, and arranged for engagement with the ground to support the barrel in an upwardly extending position. The rear end of the barrel is formed by a wall C having integral therewith an inwardly projecting collar *a*, which threads into the barrel, as shown clearly in Fig. 2. The wall C also has an outwardly extending collar *b* which receives a cap D that entirely closes the

rear end of the barrel and permits the latter to be partially or entirely embedded in the ground, as shown in Fig. 1. The wall C and cap D form a housing which defines a chamber *c* for a purpose presently to appear.

The firing mechanism includes a firing pin E which operates through the wall C, the latter having an opening that receives and constitutes a supporting guide for the firing pin. The guide is formed by an inwardly extending portion *e* formed upon the wall C and located centrally of the end of the barrel, as shown in Fig. 2.

The firing pin E is engaged by a lever F pivoted at *f* in the chamber *c*, with its inner end adapted to engage the outer end of the firing pin. The outer end of the lever *f* lies in the path of an actuating rod G, which is located outside the barrel A and extends lengthwise of the latter toward the front end. The rod G is housed within a tube *g* which is supported at one end within an opening of the wall C and is held at its opposite end by a suitable strap or support *h*. The actuating rod G carries a controlling member, preferably in the form of a bolt H, which is movable within a housing I. The actuating rod is operated by a spring J, one end of which engages the controlling member or bolt H, while the opposite end engages a plate K. The housing I is slotted longitudinally at *i* to permit longitudinal travel of the bolt H from the cocked position of Fig. 1 to the released position of Fig. 2, and is slotted transversely at *j* and *k* to permit the controlling member to be retained in cocked position, as in Fig. 1; or to retain the firing pin in its outermost position, as in Fig. 2, the latter position being desirable when it is intended to bring about the discharge of a projectile by merely dropping it within the barrel of the gun. The housing I is closed at its outer end by a cap *l*, and arranged between the plate K and the cap *l* is a resilient buffer *m* of suitably soft rubber, or other material, to take the shock of the actuating rod G when it is thrown backwardly upon the explosion of a propelling charge.

It will be seen that two methods of operation are provided for. The firing mechanism may be cocked, ready for action, as in Fig. 1, and a projectile inserted, after which the latter will be discharged upon pulling the bolt H until it is released from the slot *j*. The spring J thereupon moves the actuating rod G and forces the firing pin E against the primer of the projectile. When the parts are positioned, as in Fig. 2, the firing pin is held fixedly in its outermost position, so that when a projectile is dropped into the barrel, its primer falls into engagement with the point of the firing pin and the propelling charge is immediately exploded.

It not infrequently happens that the propelling charge fails to explode because the primer does not properly engage the firing pin. To overcome this, I have provided means for guiding the primer accurately to the firing pin, and insuring, in every instance, that the primer will be brought into true and exact firing relationship with the firing pin. This is best accomplished by guiding means coöperating between the projectile and the firing pin, and to this end, I have provided a holder for the propelling charge and primer, adapted to be permanently attached, or otherwise connected to the projectile. A conventional form of projectile is shown partially by L, and the holder, referred to above, consists of a base portion M and an elongated hollow portion N. The latter is provided at one end with a socket *n* to receive the primer, and transverse openings *o*. *p* designates the propelling powder charge, which is held around the hollow portion N preferably by a fabric bag *q*, the ends of which are suitably secured to the holder. In the structure shown in Fig. 3, one end of the fabric bag is held in engagement with the plate *r* of the projectile, the holder being secured to the projectile by the screw *s* engaging a correspondingly threaded opening in the holder. The other end of the fabric bag *q* is retained by tying it around the hollow portion N of the holder. The powder will enter through the transverse openings *o* and fill the interior of the holder, so that it is in immediate contact with the primer in the socket *n*. In the modified form of Fig. 4, providing a holder which may not be permanently attached to the projectile, the larger end of the fabric bag is held in engagement with the base, by providing a groove *t* in the latter and a retaining wire *u* engaging the bag.

The holder is provided with guiding means which coöperates with the inwardly extending portion *e* on the rear end of the barrel, already described, and thereby centers the holder and primer so that the latter contacts accurately with the firing pin. There are various ways in which this purpose can be effected, and one method consists in providing the holder with an integral, substantially cup-shaped extension O, having a beveled edge *v*. The inner diameter of the guiding member O is such that, when in final position, it engages closely with the outer surface of the extension *e*, as shown in Fig. 1. When the projectile, with the holder attached, is dropped into the front end of the barrel, if there is any inaccurate alinement, the beveled edge *v* will engage the innermost corners or edges of the projection portion *e*, thereby bringing the holder into its proper relationship with the

firing pin and surrounding guide. This insures engagement of the firing pin with the primer and the consequent explosion of the propelling charge.

While the invention is here described with reference to a particular structure, it is not intended to be limited to the disclosure set forth, but comprehends any modifications or changes which do not depart from the underlying purpose of the structure, and any other such forms of mechanism which are intended to come within the scope of my invention.

When I speak in my claims of a barrel being adapted to have its rear end embedded in the ground, I mean that the barrel may be embedded so that the ground level is above the level of the firing pin without interfering with the operation of the latter.

What I claim is:—

1. A mortar for projectiles and the like, consisting of a barrel, the lower end of which is adapted to be embedded in the ground, a firing pin located at the lower end and an actuating means located a considerable distance above the lower end, and leak-tight means for conveying movement from the actuating means to the firing pin.

2. A mortar for projectiles and the like, consisting of a barrel, the lower end of which is adapted to be embedded in the ground, a firing pin located at the lower end and an actuating means located a considerable distance above the lower end, said actuating means comprising a trigger mechanism and leak-tight means for connecting said trigger mechanism with said firing pin.

3. A mortar for projectiles and the like, consisting of a barrel, the lower end of which is adapted to be embedded in the ground, a firing pin located at the lower end and an actuating means located a considerable distance above the lower end, a tube having a leak-tight connection with the barrel of the mortar, and trigger mechanism contained in said tube.

4. The combination with a mortar having a firing pin operating in its rear end, of propelling means for a projectile comprising a holder, a propelling charge and primer mounted thereon, and means coöperating between said holder and the end of the barrel and acting to cause the primer to be brought into accurate position with respect to the firing pin, the means at the end of the barrel guiding the firing pin.

5. The combination with a mortar having a firing pin operating in its rear end, of propelling means for a projectile comprising a holder, a propelling charge and primer mounted on the holder, and guiding means coöperating between the holder and a portion of the barrel, whereby the primer is brought into accurate relationship with the firing pin, the means at the end of the barrel guiding the firing pin.

6. The combination with a mortar having a firing pin operating in its rear end, of a supporting guide for the firing pin including an inwardly extending portion located centrally of the rear end, means for propelling a projectile comprising a holder, a propelling charge and primer mounted thereon, and means on the holder adapted to coöperate with said inwardly extending portion, whereby to insure accurate positioning of the primer with reference to the firing pin.

7. The combination with a mortar having a firing pin operating in its rear end, of a supporting guide for the firing pin including an inwardly extending portion located centrally of the rear end, means for propelling a projectile comprising a holder, a propelling charge and primer mounted thereon, and a substantially cup-shaped guiding portion on the holder which cooperates with said inwardly extending portion on the barrel and effects accurate relative positioning of the primer and firing pin.

8. The combination with a mortar having a firing pin operating in its rear end, of a supporting guide including an inwardly extending portion located centrally of the rear end, means for propelling a projectile comprising a holder which is hollow for a portion of its length and has openings extending transversely of said hollow portion, a powder charge surrounding and also within said hollow portion and held in place by retaining means, the holder having a primer socket at one end, and guiding means surrounding the primer socket and adapted to coöperate with the aforesaid inwardly extending portion on the barrel to effect accurate relative positioning of the primer and firing pin.

9. The combination with a mortar having a firing pin operating in its rear end, of a supporting guide including an inwardly extending portion located centrally of the rear end, and a projectile having propelling means attached thereto and comprising a holder, a propelling charge and primer mounted on the holder, and means on the holder adapted to coöperate with said inwardly extending portion to effect accurate relative positioning of the primer and firing pin.

10. The combination with a mortar having a firing pin operating in its rear end, of a supporting guide for the firing pin including an inwardly extending portion located centrally of the rear end, and projectile-propelling means comprising a holder, a propelling charge and primer mounted thereon, a fabric retainer surrounding said charge and secured to the holder, means for

attaching the holder to a projectile, and guiding means on the holder adapted to cooperate with said inwardly extending portion and effect accurate relative positioning of the primer and firing pin.

11. A gun or mortar embodying a bore, a closed breech, a centrally disposed firing pin, and a trigger mechanism embodying a plunger for functioning the firing pin or locking said firing pin in fixed position at the option of the gunner.

In witness whereof, I have hereunto signed my name.

AXEL G. BERGMAN.