S. C. DAVIDSON.
PROJECTION OF EXPLOSIVE SHELLS, BOMBS, OR GRENADES.
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The vent may take the form of an opening in the barrel at the breech end, near or adjacent to an explosion chamber, into which the gaseous products of combustion from the propellant charge expand, and said vent is fitted with said valve, whereby it can be opened more or less to allow a predetermined portion of the gases to be discharged into a venting passage therefrom, said barrel being constructed to swing over to one side on a hinge of longitudinal axis in the stock containing the lock and firing mechanism, in order to insert the shell into the breech of the barrel. The fixed breech block for the hand howitzer is made in the form of a suitable pistol-like stock or handle for firing from the hand, the firing mechanism being of any usual or suitable type, or of the kind hereinafter described in detail, and may be provided with means whereby it may alternatively be hung upon or held against a vertical support to better insure a constant, or approximately constant, angle of elevation of say 45° or more or less if preferred.

The fixed breech block for the tripod howitzer is made with a vertical socket in the stock or handle into which a vertical pin, which forms part of a tripod base or carriage, projects, and upon which the stock has a rotary movement at a constant angle of elevation, say 45° or more or less if preferred.

The length of range obtainable with either the hand or tripod howitzer, when fired at a constant angle of elevation, and with a constant charge of propellant powder, can be varied to any required intermediate distance between the maximum and minimum range attainable with the charge used, by so adjusting the valve in the vent as to freely by-pass such portion of the volume of the gases from the exploding charge as will sufficiently reduce their operative propulsive pressure against the base of the shell, and thereby shorten its throw to the required extent.

In the accompanying drawings, Figures 1 to 7 illustrate the construction of both the hand and tripod howitzer.

Figs. 1 and 2 illustrate the construction of the hand howitzer made in accordance with the present invention, Fig. 1 being a side elevation view of the hand howitzer, and Fig. 2 an end elevation from the rear of the stock.
Fig. 3 is a side elevation of the tripod howitzer, and Fig. 4 is an end elevation from the rear of the stock. Fig. 5 is a section of the by-pass valve in its fully closed position. Fig. 5a is a section of the by-pass valve in its fully open position. Fig. 5b is a cross section through line d'd' of Fig. 5 showing a longitudinal elevation of the valve itself, with narrow sliding rims and oil channels at each end. Fig. 6 shows the tripod howitzer upon its tripod stand.

Fig. 7 is a plan of the tripod stand. In the construction shown in Figs. 1 and 2, the hand howitzer is made of two main castings a and b, the casting b comprising the stock with handle, and fixed breech block c provided with a chamber for the firing mechanism, said casting also has lugs e forming a longitudinal hinge in combination with corresponding lug e' on the barrel a. Said lug e' is suitably bored for a hinge pin e'' to pass through same. The casting a comprises a barrel, open at both ends, and adapted to swing over on said longitudinal hinge from a position in alignment with the breech block e to a position at one side (see the dotted position Fig. 2) to permit of the free introduction of the shell into the breech a of the barrel a. The barrel a is locked in position by a locking catch l which engages into a notch l' in the breech end of the barrel a, and p and p' are stops respectively on top and side of breech end of barrel to prevent upward and forward jump of barrel. p' is a projection upon the under side of muzzle which rests upon top of outer lug e, and prevents downward movement of muzzle, so that the joint effect of these three stops prevents undue shock or strain on hinge e' when the explosion of the propellent charge occurs. A tapered guidance is provided on the breech end of the barrel leading up to the notch l', whereby the swinging up of the barrel from its loading position at the side to the firing position enables the locking catch l to gradually ride into the locking notch l', the catch being spring-pressed for this purpose.

o is the by-pass passage leading from a suitable point at the inner end of the barrel a to a longitudinal venting passage or tube o'. p is the rotary plug valve by which the outlet through the by-pass is adjusted. The said valve, or an extension thereof, projects through a bearing on the side of the tube o' on the upper side of the barrel, and is operated by a radial arm p' which moves over a quadrant suitably graduated whereby the exact opening of the valve may be predetermined by moving the arm p' over the scale, and thereby opening or closing the valve p as required between the maximum and minimum limits shown on Fig. 5 and 5a, to increase or diminish the effective area of the vent. The valve p is provided with narrow sliding rims p' (see Fig. 5a) to prevent as little surface as practicable for the deposit of carbon due to the explosion of the propellent charge. Oil channels p'' are provided between the rims p' which allow an abundant circulation of lubrication around and over the entire bearing surfaces of the valve.

Extending rearwardly of the breech block c, two sides of the stock form a box section within which the hammer h of the firing mechanism slides, and the firing mechanism shown consists of a trigger d pivoting on a pin f, the other end of which is provided with two arms g g', one engaging the locking notch at the end of the hammer h, while the other extension is formed with a rounded end engaging a slide k which in returning to normal position after the hammer has fired the cartridge, and the trigger d is released, engages a notch k' in the hammer and retracts the hammer so far as to permit the firing point of the hammer h to clear the breech end of the barrel, and thereby permit the barrel to be swung to one side on the hinge e for recharging. i is the spring for the firing mechanism, and is held in position by lugs or projections i' fitting loosely into suitable slots in the side plates. The opposite ends of the spring bear respectively against the hammer h and the trigger d. In Fig. 1 an oil can u is shown screwed into the base of the handle part of the stock b.

In order that the hand howitzer may be held upon or against a vertical support or post, at an angle of about 45°, or other selected angle, the underside of the front end of the stock b is provided with a hook x between the inner face y thereof, and the lower abutment y' on the stock, so that when the underside of the hook x is rested on the upward projecting edge of a vertical plate attached to a vertical post, and the abutment y' pressed against the vertical face thereof, the axis of the barrel will lie at the required angle, giving the corresponding elevation, and an accurate and steady aim will thus be secured.

Referring now to the tripod howitzer for larger shells, as shown in Figs. 3, 4, 6 and 7, the general construction of the barrel casing, and breech and firing mechanism are the same as that described for the hand howitzer, except that the parts are slightly modified for the larger construction, and for the mounting which in this case consists of a vertical socket or pivot q adapted to rotatably fit upon a vertical pillar r on the support or tripod stand t, in Figs. 6 and 7, the angle of the socket being such that when so mounted on the pillar the axis of the barrel will normally occupy an angle of say 45° as indicated in Fig. 6. The venting by-pass o
and the valve \( p \) are as described for the hand howitzer.

In use a shell is loaded into either the hand or tripod howitzer barrel, said shell having attached to its base a cartridge containing a propellant charge of powder (for example such as described in my application for patent Ser. No. 126,434). Before firing the valve arm is adjusted on the quadrant to the maximum or minimum, or any required intermediate range. The maximum range is obtained when the valve is completely closed, and the reduced ranges down to minimum according to the extent to which the valve is opened, whereby the vent will so far reduce the pressure force of the propellant charge by liberating and by-passing a portion of the gases through the venting barrel, that the range of the shell will be shortened accordingly.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a breech loading hand or tripod howitzer, a stock, a breech block fixed to the stock, a barrel part pivoted to said stock, a vent in said barrel part disposed adjacent to the propelling charge, and an adjustable plug valve in said barrel part for regulating the size of the vent.

2. In a breech loading hand or tripod howitzer, a stock, a breech block fixed to the stock, a barrel part pivoted to said stock, a vent in said barrel part disposed adjacent to the propelling charge, and an adjustable plug valve in said barrel part for regulating the size of the vent.

3. In a breech loading hand or tripod howitzer, a stock, a breech block fixed to the stock, a barrel part pivoted to said stock, a vent in said barrel part disposed adjacent to the propelling charge, and an adjustable plug valve in said barrel part for regulating the size of the vent, and means for rotating the tripod howitzer on a vertical axis.

4. In a breech loading hand or tripod howitzer, a stock, a breech block fixed to the stock, a barrel part pivoted to said stock, a vent in said barrel part disposed adjacent to the propelling charge, and an adjustable plug valve in said barrel part for regulating the size of the vent, and means for indicating the position of the adjustable plug valve.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

SAMUEL CLELAND DAVIDSON.

Witnesses:

ALFRED AUGUSTUS AGAR,
WILLIAM PEOPLES BLACK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."