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2,359,515

VARIABLE RANGE PROJECTILE

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Fig. 1.

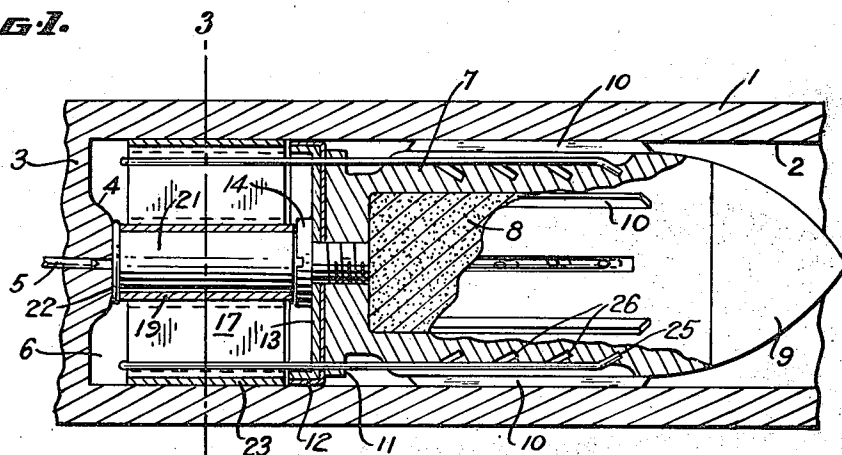


Fig. 2.

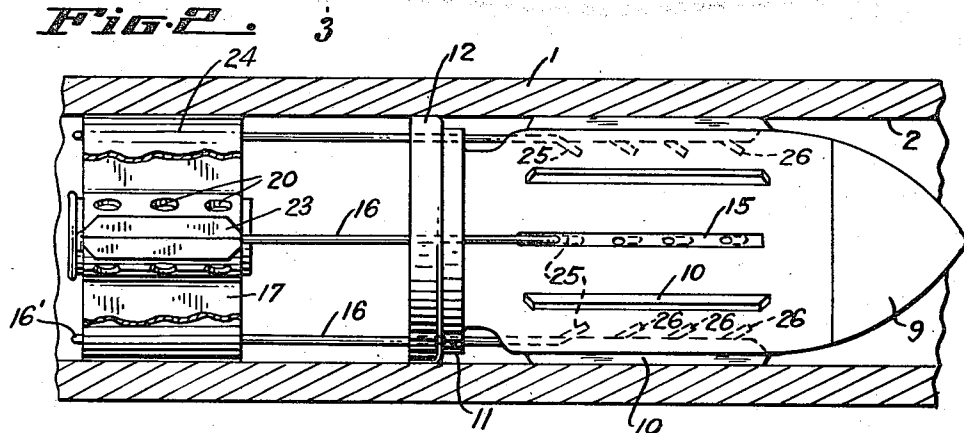
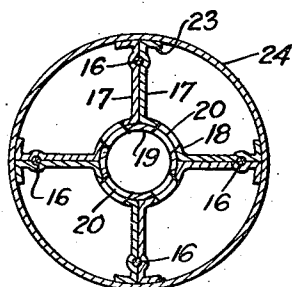


Fig. 3.



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VARIABLE RANGE PROJECTILE

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Application April 6, 1942, Serial No. 437,733

9 Claims. (Cl. 102—49)

This invention relates to explosive projectiles as used in warfare, and particularly to such projectiles as are shot from the mortar type of guns and where it is important to predetermine the distance the projectile will carry, and the principal object of the present invention is to provide an explosive shell or projectile which may be adjusted to carry various distances with a given angle of trajectory and given propelling explosive charge.

Other advantages include an improved flight guiding fin arrangement, and a collapsible construction which greatly conserves space in storing and transportation. Other features and advantages of the invention will appear in the following description and accompanying drawing.

In the drawing:

Fig. 1 is a side view of my improved projectile shown in collapsed condition within the bore of a gun or mortar and with parts of the projectile shown in section.

Fig. 2 is a view similar to that of Fig. 1 but with the projectile in extended condition and further out in the gun barrel as after firing.

Fig. 3 is a cross section of the extendible tail fin portion of the projectile as seen from the line 3—3 of Fig. 1.

Briefly described the invention comprises an explosive projectile of the type adapted to be projected from a mortar, with the addition of an assemblage of tail fins connected to the body of the projectile by means of extendible arms so that the tail fin assemblage may be pulled back, away from the projectile body and locked in any of several positions against return movement, yet free to pull back to the full limit by the effect of the firing charge as the projectile passes along the barrel of the gun. By this means several things are accomplished:

1. A compact projectile is automatically elongated with flight guiding fins stretched out in back to thereby give much better control of flight.

2. By pulling out the tail fin assemblage to various distances, before firing, the size of the explosion chamber in the gun beneath the projectile may be predetermined, and since a uniform expelling charge is always used, the size of the explosion chamber is inversely related to the distance the projectile will be hurled.

3. By having the tail fin assemblage at the rear end of a light set of arms and spaced a relatively long way in back of the body of the projectile, it is therefore much more effective in controlling the flight of the moving projectile.

In Fig. 1 of the drawing 1 indicates a gun or mortar barrel, 2 the bore, 3 the bottom or breech end of the bore, 4 a hub within the bore through which the firing pin 5 operates, while 6 indicates an annular depressed portion of the gun barrel forming a firing deposit receiving chamber.

In Fig. 2 an advanced portion of the gun barrel 1 is shown with the projectile also advanced as well as extended to greater length due to the act of firing. The projectile comprises a cylindrical shell or body 7 filled with any desired type of explosive 8, and having the usual percussion head 9 or its equivalent for firing the shell charge through suitable fuse means not shown as the shell internal construction may assume any of a variety of forms not involved in the present invention, though some of its external features are shown and claimed in my joint pending application for patent filed on April 18, 1942, under Serial No. 439,456, as will be more fully explained.

The shell is preferably of substantially smaller diameter than the bore of the gun and is fitted exteriorly with spaced ribs 10 which do fit the bore and centralize the shell therein. The base of the shell is outwardly flanged as at 11 and secured to the bottom of the flange is a soft metal cup-like member 12 preferably of very thin sheet metal fitting within the bore and supported within by a similar cup-like member 13 of thicker rigid metal, both secured to the base of the shell as by one or more screws 14 or otherwise.

Spaced around the body of the shell are longitudinally extending grooves 15 lying in which are rods 16 which slidably extend through aligned holes in the margins of members 11, 12 and 13 and passing rearwardly through an assemblage of flight control fins 17. These fins 17 are each preferably formed of two sheets of metal suitably riveted, welded, or otherwise fastened together and confrontingly indented to tightly receive the rear ends of rods 16 which are preferably riveted over at their outer ends as at 16' and welded in place.

Fins 17 are radially disposed and shaped to form a centrally disposed cylinder 18 preferably reinforced by an inserted tube 19 and both are pierced by relatively large holes 20. The bore of the inner tube and its length being such as to receive a conventional shot gun cartridge shell 21 with its cap end flange 22 seated against the end of the tube as shown in Fig. 1 and its forward end just clearing screws 14 or plate 13 when the fin assemblage is in collapsed or telescoped position.

The radial portions 17 of the fins are flanged outwardly at their ends as at 23 and riveted or welded to a ring or collar 24 of sheet metal which slidably fits into the bore 2 of the gun or mortar, and the forward ends of the slidable rods 16 are bent slantingly downwardly or inwardly as at 25 in a manner to engage successively a row of sockets or notches 26 extending inwardly and slantingly forward as shown best in Fig. 1, all so that from the collapsed or forward position of the tail fin assemblage shown in Fig. 1, the assem-

blage may be pulled back to snap the rod ends 25 into any of the sockets 26 to thus space the fin assemblage at any desired distance outward or in back of the base of the shell, and of course carry the shot gun shell back also. To move the assemblage forward again if inadvertently pulled back too far the rods would have to be pried up out of their sockets.

Cup members 12 and 13 are exposed to the explosion gases of the cartridge shell so as to be expanded snugly against the wall of the gun bore, similarly to the action of the cup leather of a pump, and therefore provide a seal as the projectile is ejected.

In use, shot gun shells with a powder charge but without shot are used to create the expelling pressure, and holes 20 in the confining tube facilitate its quick release through the disrupted wall of the paper case.

As the rearward spacing of the fin assemblage results in a forward spacing of the projectile base it of course enlarges the explosion chamber of the gun accordingly, and likewise lowers the effective pressure produced, and reduces the range of the projectile. Therefore the use of a standard powder charge, and a predetermined spacing of the sockets 26 made after firing tests at various gun angles, makes it easy to provide a printed table, or rule for adjusting the telescopic tail fins to secure the proper size explosion chamber for the range desired. However, whether or not the tail fin assemblage is drawn outward, it will always automatically pull back to the limit after firing before leaving the gun due to the fact that the major force of the explosion is directed against the base of the projectile body and the inertia and friction of the fin assemblage makes it lag sufficient to pull the rods back until their inwardly bent ends strike flange 11, and thus the value of a flight guiding tail fin assemblage spaced a considerable distance behind the body of the projectile is always secured.

In considering the construction it is evident that the sockets or notches 26 may just as well be in the sides of the grooves 15 instead of the bottom if desired. Also that as the rods in fact form a plurality of ratchet bars, any equivalent type of ratchet bars, rods, or wires may be used.

Having thus described my invention and the manner of its use what I claim in the present application is:

1. A projectile of the character described having an elongated cylindrical body closed at its front and rear ends, a plurality of grooves extending longitudinally of the body, a plurality of rods slidably positioned in said grooves and extending rearwardly beyond the body, a flight guiding tail fin assembly secured to the rear ends of said rods freely accessible at the rear end of the projectile body whereby the tail fin assembly may be manually moved from a position close to the body to an extended position spaced to the rear of the body, and stop means preventing total withdrawal of said rods, and means locking the rods when withdrawn against forward movement with respect to the body.

2. In a construction as set out in claim 1 a flange on the base of the projectile having holes through which said rods slidably extend to said tail fin assembly.

3. In a construction as set out in claim 1 said tail fin assembly including a central tubular hub adapted to receive a cartridge shell, a plurality of radial fins projecting from the hub, said radial fins being of two layers of sheet metal and with

the rear ends of said rods, each embraced between the sheet metal layers of one of said radial fins and secured against withdrawal.

4. A projectile of the character described having an elongated cylindrical body, a plurality of grooves extending longitudinally of the body, a plurality of rods slidably positioned in said grooves and extending rearwardly beyond the body, a flight guiding tail fin assembly secured to the rear ends of said rods whereby the tail fin assembly may be moved from a position close to the body to an extended position spaced to the rear of the body, and stop means preventing total withdrawal of said rods, and means locking the rods at various degrees of rearward extension against forward movement with respect to the body.

5. In a construction as set out in claim 4 the means locking the rods against forward movement comprising spaced notches extending laterally from said grooves, and the ends of said rods bent in a manner to spring into said sockets successively as they are drawn rearwardly.

6. In a projectile of the character described, a flight guiding tail fin freely accessible at the rear end of the projectile, and means slidable with respect to the projectile extendibly connecting said tail fin to the projectile whereby the tail fin may be manually positioned adjacent to the rear end of the projectile or extended and spaced rearwardly therefrom, and means for locking said tail fin when withdrawn against forward movement relative to said projectile, said tail fin being an assemblage including a central cartridge supporting socket adapted to align a cartridge with the firing pin of a gun in which the projectile is placed.

7. In a construction as set out in claim 6 stop means limiting the total extension of the tail fin assembly, and the means extendibly connecting the tail fin assembly to the projectile being free enough in its operation to permit the assemblage to lag and draw out the connection to the limit of said stop means as the projectile is fired from a gun.

8. In a projectile of the character described a flight guiding tail fin at the rear end of the projectile, and ratchet rods extendibly connecting said tail fin to the projectile whereby the tail fin may be positioned adjacent to the rear end of the projectile or extended and spaced rearwardly at various distances therefrom and locked by said ratchet rods against forward movement relative to the projectile while permitting reverse movement to full extension after the projectile is fired, said tail fin comprising a central tubular hub adapted to receive a cartridge shell and radial fins extending from said hub.

9. In a projectile of the character described, a flight guiding tail fin at the rear end of the projectile, and ratchet rods extendibly connecting said tail fin to the projectile whereby the tail fin may be positioned adjacent to the rear end of the projectile or extended and spaced rearwardly at various distances therefrom and locked by said ratchet rods against forward movement relative to the projectile while permitting reverse movement to full extension after the projectile is fired, said tail fin comprising a central tubular hub adapted to receive a cartridge shell, and radial fins extending from said hub, and a sheet metal ring embracing the outer ends of the radial fins and secured thereto.

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