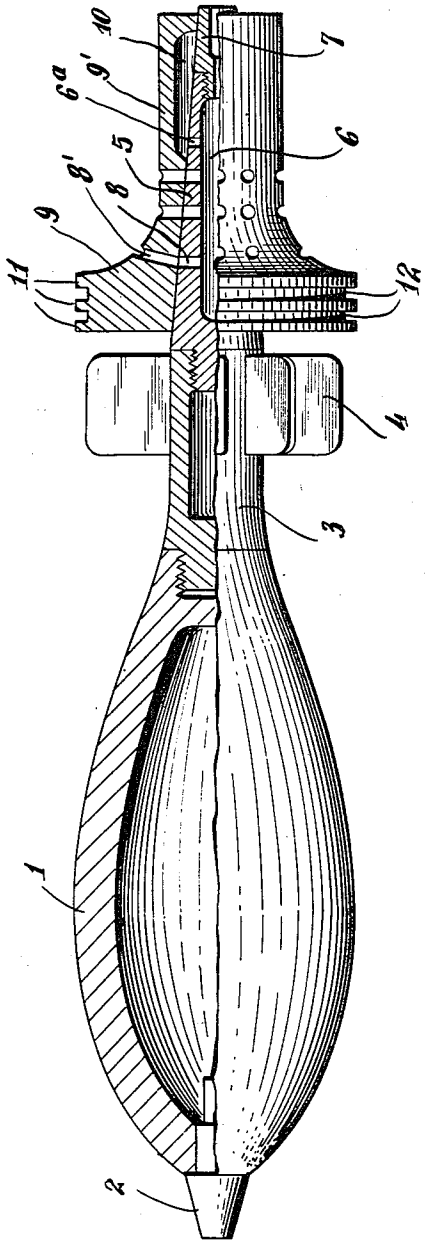
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MORTAR PROJECTILE

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INVENTOR.
Hans Otto Donner
BY Haseltine, Lake & Co
AGENTS.

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MORTAR PROJECTILE

Hans Otto Donner, Tampere, Finland, assignor to Soltam Ltd., Haifa, Israel

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This invention relates to new and useful improvements in trench and field mortar projectiles.

A trench or field mortar is a weapon for firing fin-stabilized or non-spinning projectiles with some elevation, generally not less than 40°, from a barrel provided with an internal smooth bore, the lower or breech end of which is adapted to be engaged by means of a ball or cardan type joint in a ribbed base plate which relays to the ground the shocks incident of firing and recoil. The muzzle part of the mortar barrel is supported on a cradle provided with a coil spring assembly and adapted to be attached resiliently to a suitable bipod or tripod support.

Military weapons adapted to fire projectiles and impart thereto a speed of Mach number less than 1 are known. Recently, projectiles have been developed which retain their stability between Mach numbers 1 and 1.3, but the firing range of these projectiles is limited by the fact that the fins, due to the resistance of air, tend to reduce the ballistic efficiency of the projectile by an amount roughly proportional to fin thickness. This fin thickness cannot be reduced indefinitely for the reason that the fins must normally withstand the reaction forces of turbulent gases developed in the barrel.

This invention has for its object to free the fins of the influence of gases by the provision of a suitable obturating member to separate the fins entirely from the powder chamber proper.

The invention together with its object and advantages will best be understood from a study of the following description, taken in connection with the accompanying drawing wherein a mortar grenade embodying the invention is shown in principle.

The drawing illustrates a side view, partly in longitudinal section, of a mortar projectile constructed in accordance with the present invention.

Referring to the drawing the projectile embodies the following main parts and constructional details: a metallic main body 1 filled with an exposive charge and having a percussion cap 2 attached to the fore end thereof, a tail 3 on which suitable fins 4 are mounted. To the tubular part 3 of the tail is secured a rearwardly conical thrust member 5 having a frusto-conical outer surface tapering rearwardly and having bored therein a longitudinal chamber 6 for an initial cartridge. The rear end of the thrust member 5 carries a member 7 for igniting the initial cartridge and adapted to receive the flash charge. The member 5, moreover, is provided with radial passages 8 through which the gases from the charge of explosive in the chamber 6 travel. About the member 5 is arranged an obturating member 9 having a central rearwardly extending extension 9′ and provided with a central, rearwardly tapering passage which tapers at an angle smaller than that of the outer surface of thrust member 5. This member 9 is provided with passages 8′ corresponding to the radial passages 8 of the member 5. Moreover, the extension 9′ of the member 9 has its inner wall contoured to define a cylindrical

chamber 10 which via a passage 6a, is in communication with the initial cartridge chamber 6 but has no passages leading away therefrom.

The greatest diameter of the obturating member 9 is slightly greater than the greatest diameter of the assemblage of fins and almost equal in diameter to the diameter of the internal bore of the mortar barrel. Hence, the mortar projectile made according to the teachings of this invention enters into the barrel along point 11 where the diameter of the member 9 is greatest. As shown in the drawing the member 9 is provided at point 11 with two grooves 12 so the member 9 comprises three separate usually disc-like pieces of equal diameter for engaging the bore of the barrel. The said grooves 12 are provided for the purpose of preventing gas pressure from being expanded past the space between the barrel and the member 9 into the barrel part housing the projectile fins.

In the embodiment shown in the drawing the angle of the outer cone of the member 5 is greater than that of the known Morse projectile. On the other hand, the said angle should be so small as to preserve the streamline shape of the projectile during its flight through the air, in consequence of which the resistance of air decreases resulting in a corresponding increase in firing range of projectile. The member 9, provided with conical passages and arranged about the member 5 to push the said member 5 and consequently the whole projectile disposed within the barrel forward thereby imparting the required speed thereto, is adapted to be blown from the projectile immediately after the projectile is discharged from the barrel. This is effected in the main by gas pressure developed in the chamber 10 by the initial cartridge, in consequence of which the rear wall of said chamber recedes. The resistance of air assists also in blowing the obturating member 9 from the member 5.

By use of the hereinabove described construction it is possible to reduce fin thickness to less than one fifth of that normally used otherwise and thereby appreciably increase the firing range of the projectile.

It is to be understood that while a specific form of the projectile has been described for the purpose of illustration, other forms may be utilized with equal effect. For example, the tubular tail part 3 may be formed integral with the thrust member 5. Also, the body 1 may be made integral with the tubular part 3 to which is then secured the conical member 5 of light metal. The invention also contemplates an initial cartridge receiving chamber 6 so long as the same will project into the tubular tail part 3 in which case, however, the radial passages 8 are arranged to lead reaction gases developed by the initial cartridge into the mortar barrel back of the obturating member 9.

Having thus described my invention, what I claim as new and desired to secure by United States Letters Patent is:

1. In a mortar projectile for discharge from a mortar and having fins on its rear end, a frusto conically shaped thrust member extending rearwardly from the rear end of the projectile and having an internal cavity housing an initial charge, an obturating member removably mounted on said thrust member and having an outer diameter slightly greater than said fins and a reduced rearward extension surrounding said thrust member, said thrust member and said rearward extension having radially aligned passages extending from said internal cavity for discharging the forces of the initial charge within the barrel to the rear of said obturating member which is removed from said thrust member when the projectile leaves the mortar barrel.

2. A mortar projectile according to claim 1, wherein

said obturating member has a diameter almost equal to the bore of the mortar barrel and its peripheral edge is provided with spaced circumferential grooves.

3. A mortar projectile according to claim 1, wherein said obturating member and rearward extension have a central, rearwardly tapering bore extending therethrough and receiving said thrust member, and wherein the cone angle of said thrust member is greater than the angle of taper of said bore of the obturating member and rearward extension so that said thrust member is contacted only in the portion of said bore within said obturating member, said rearward extension has an annular recess in the surface of said bore defining a closed chamber surrounding and in communication with the exterior surface

of said thrust member, said thrust member has a passageway connecting said chamber with said internal cavity containing the initial charge to cause said obturating member to be blown off the rear end of said thrust member by the force of said initial charge entering said chamber through the last mentioned passageway and as the projectile leaves the mortar barrel.

References Cited in the file of this patent

UNITED STATES PATENTS

183,674	Hotchkiss	Oct. 24, 1876
195,040	Owen	Sept. 11, 1877
2,657,630	Blacker	Nov. 3, 1953