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PROJECTILE NOSE STRUCTURE

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1 Claim. (Cl. 102—52)

The present invention relates to improvements in ordnance projectiles and more particularly concerns the construction of the nose end portions of such projectiles.

Streamlined projectiles such as artillery shells, low drag bombs and the like are generally provided with hard, symmetrically ogived penetrating tips or points in or on the noses thereof having the dual function of eliminating or at least reducing wind resistance during travel of the projectile from firing mechanism or release from the bomb bay of an airplane, as the case may be, and for facilitating penetration of the projectile into the target.

Where the pointed tip of the hard nose strikes a relatively hard target surface at an oblique angle there is not only a tendency to deflect from course but also to twist and deflect the nose portion of the projectile relative to the body portion of the projectile. In the latter event the projectile may collapse or at least become so warped or disfigured as to resist penetration of the target at least to the desired depth.

It is therefore an important object of the present invention to overcome the foregoing and other problems encountered in connection with projectile structures.

Another object of the invention is to provide an improved ordnance projectile nose structure which affords a streamlined pointed tip for minimizing air resistance but also provides an effective shearing edge on the nose structure to facilitate penetration of the projectile when contact is made with a target on a trajectory axis oblique to the target surface into which the projectile must penetrate.

A further object of the invention is to provide in a projectile nose structure a novel normally shielded shearing edge.

Still another object of the invention is to provide such a novel shearing edge in combination with improved means for avoiding distortion or buckling of the nose portion of the projectile.

A still further object of the invention is to provide an improved projectile construction including novel means for avoiding deflection or undue resistance to penetration in depth of the projectile into a target having a hard surface approached obliquely by the projectile.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment thereof taken in conjunction with the accompanying drawing, in which:

Figure 1 is a side elevational view of a projectile shell member embodying features of the invention;

Figure 2 is a fragmentary enlarged vertical sectional detail view taken substantially on the line II—II of Figure 1; and

Figure 3 is a fragmentary more or less schematic sectional elevational view disclosing the relationship of the nose of the projectile to a target surface at the moment of contact of the shearing edge of the projectile nose with the target.

Although it will be apparent that the invention is

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adaptable for use in other types of ordnance projectiles, it is exemplified herein as applied to the head shell 5 of a low drag bomb. Such a shell may be several feet long and provided with a fairly long ogive tapered nose portion 7 terminating in a thickened internally directed collar 8 concentrically machined to provide a bore 9.

Within the outer end portion of the bore 9 is an internally threaded structure 10 for receiving and securing a threaded stem 11 on a hard nose tip member 12.

On its outer surface the nose member 12 is shaped as a continuation of the ogive of the nose portion 7 of the shell so that when the tip member 12 has been drawn tightly down against the tip of the collar portion 8 the tip 12 continues uninterruptedly the ogive streamlining of the nose portion of the shell.

In order to effect a locking, spread resisting engagement of the nose member 12 with the tip of the shell proper, an undercut annular shoulder 13 sloping outwardly from the base of the stem 11 provides an overhanging marginal interlock with a complementary tapered annular tip surface 14 on the shell. Thereby, pressures tending to spread the tip portion of the shell away from the nose member 12 are resisted, especially during impact of the nose member against a target.

For the purpose of enabling efficient penetration of a target without deflection or tendency to distort the nose portion of the shell assembly, an annular shearing edge 15 is provided on the extremity of the hard nose tip member 12. This shearing edge is on the marginal extremity of the tip member and in a convenient form is defined at the inner side thereof by a concavity 17 or recess symmetrically formed on the axis of the tip member. By having the concavity 17 of shallow, concave, smooth surface, minimum resistance to sliding thereover of target material during penetration will be encountered.

Upon reference to Figure 3, the relationship of the shearing edge 15 at the moment of impact of the shell nose tip 12 with a target T upon approach of the shell or bomb head 5 at an oblique angle to the contacted surface of the target is shown. Assuming that the target T comprises an armored structure such as a battle ship, tank or other armored structure, with that portion of the target shown consisting of armor plate, it will be appreciated that the shearing edge 15 will cut through the armor, with the force of the shell or bomb head distributed over the substantial extent of the shearing edge as it shears into the target, rather than concentrated at a tip as is conventional. This substantially eases the shock on the shell 5 and minimizes tendency of the tip 12 to cant or cause spreading of the nose end of the shell. Of course, by virtue of the undercut interlock effected between the nose tip of the shell and the overhanging shoulder 13 of the tip member 12 any such tendency toward spreading or distortion of the shell tip relative to the nose tip 12 is minimized.

It should also be observed that if, as a result of initial striking of the target T by the shearing edge 15 eccentrically relative to the axis of the shell, as shown in Fig. 3, there is any tendency for deflection of the shell from its oblique trajectory axis, such deflection is toward a more nearly normal entry into the target, that is biased more nearly toward the perpendicular so that the shell may penetrate the target more advantageously. This is quite contrary to the tendency upon a sharp point tip striking the target obliquely since the tendency with such a tip is to deflect the shell further off center rather than tending to deflect the shell toward a more centered, or normal or perpendicular relation to the target as with the present construction.

Since it is highly desirable in order to avoid wind resistance to have the tip of the shell as pointed and

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streamlined as possible, means are provided for capping the tip member 12 for this purpose. To this end, a light weight centrally pointed cap member 18 is mounted upon the nose tip member 12. The external shape of the cap member 18 is formed as a continuation of the ogive of the shell nose portion 7 and the external surface of the tip member 12.

For snug flush mounting of the cap member 18, the distal end portion of the tip member 12 is formed with an inset annular groove 19 of a depth equal to the thickness of the proximal marginal flange portion of the cap member. The construction is such that the marginal flange of the cap member snugly tightly fits within the groove 19 flush with the external surface of the tip member 12.

Since on impact with target it is desirable to have the entering, shearing edge 15 shearingly engage the target, the cap 18 is constructed of a material that will be destroyed, preferably by disintegration on engagement with the target. For this purpose, the cap 18 may be constructed of a frangible metallic or non-metallic material possessed of sufficient tensile strength to withstand handling and assembly with the shell unit and to withstand normal usage in handling of the shell for transportation, storage and firing. However, on contact with the target the cap 18 will disintegrate or be destroyed to expose the hollow tip, shear edge rimmed extremity of the nose member 12 for the shearing, target penetrating action hereinbefore described.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

In a shell construction of the character described, a hollow shell member having a generally ogived nose por-

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tion, an annular forwardly facing shoulder on the forward extremity of said nose portion about a central opening into the hollow interior of the shell, and a hard penetrating tip nose member having a short central rearwardly extending stem projecting into said opening and secured therein and provided about the base of said stem with a rearwardly facing annular shoulder seated upon said nose portion shoulder, said nose member having an external ogive flush with and complementary to the ogive of said shell nose portion, the tip of said nose member being generally blunt and provided with a marginal annular generally forwardly projecting shearing edge terminus aligned with said shell portion shoulder for substantially direct thrust force thereto, said shell shoulder being beveled off rearwardly and outwardly and said nose member shoulder being complementary in an overhanging interlock relation to said shell shoulder for resisting distortion or spreading of the shell forward extremity and tilting of the nose member relative to the shell axis on impact of the shearing edge with a target and transfer of thrust impact to said shell shoulder by said nose member shoulder.

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