

DESCRIPTION

The invention relates to an insert for a projectile-forming charge in accordance with the definition of the species of claim 1.

A projectile-forming explosive-charge insert of the type forming the species is known from DE-A- 2 913 103 or respectively from FR-A- 1 372 142 or respectively FR-A- 2 425 047. For the furtherance of the procedure of the implosion transformation of the insert into the projectile directed at a target, provision is made for causing the material thickness to increase from the centre to the region of the clamped base edge of the insert; thus to choose an insert which has a material thickness which is non-constant in the centripetal direction.

It has been shown that such a configuration of the insert does indeed, in the case of calibres of medium order of magnitude, still lead to favourable geometric conditions with respect to the deformation properties of the insert and, thus, to a projectile of high penetrating power at distances of a medium order of magnitude. If, however, the attack distance of the projectile formed from the transformed insert is increased, its penetrating power in the target

declines appreciably, which can be attributed more especially to flight properties of the projectile which become increasingly unstable. If the projectile from the insert is shaped for the explosive charge of a relatively large-calibre munition article, this leads to an even more severe impairment of the flight properties, because the large mass of the thick base region of the insert of large circumference leads to a geometrically scarcely still predeterminable irregular bead, thus over the circumference of the projectile to extremely irregular distribution of the drags. As a result, it has become apparent that, by reason of these factors, with comparable target distances the larger-calibre munition results in a poorer penetrating effect of the insert projectile than smaller-calibre munition, and that tight limits are set on an increase, to be striven after, of the target range by reason of increasingly unstable flight path in view of the desired penetrating power in the target.

In recognition of these factors, the problem underlying the invention is to design a projectile-forming explosive-charge insert of the type in accordance with the species in such a way that in the course of the transformation it leads to a projectile which even in the case of larger-calibre munition and in the case of (translator's note: here some words would appear to be missing in the German text as

the German makes no sense) target.

In accordance with the invention, this problem is essentially solved in that the insert in accordance with the definition of the species of the main claim also has the characterising features thereof.

Such an insert which is bevel-shaped in elevation, namely has a material thickness which fluctuates in the peripheral direction, furthermore makes it possible, in the interests of an implosion of the insert which progresses specifically from the centre outwardly, to accommodate relatively large masses at the insert base; whilst, on the other hand, the thickness fluctuations in the circumferential direction lead to the fact that specific centripetally extending zones of the insert preferably experience their implosion folding-in and allow the thicker insert edge regions after the folding-in to protrude in star-shaped manner in cross-section as flow-favourably shaped stub wings on the tail of the projectile. The bevel-shaped fluctuation of the material thickness of the insert thus not only furthers, despite large diameter and thick insert base, the rapid formation of the projectile, but more especially now also a projectile formation in flow-favourable geometry, thus the launching of an insert projectile in a relatively stable flight path and

thus with great penetration effect even after covering relatively great target distances.

A projectile having these properties does not come about with inserts of such configurations as are known from the above-quoted species-forming prior publications; and from those prior publications manifestly also no kind of reference can be derived to varying periodically, in the interests of improved combat effect in the case of larger-calibre munition despite great target distance, the material thickness of the insert also in the peripheral direction, so that upon the folding of the projectile a flight path which is more stable because of specific stub wings on the tail of the projectile can be achieved.

This specific folding, similar to a tail unit, of the tail of the projectile is effected by periodically varying material thickness in suitable regions of the metal cover.

For the wings brought about by the tail-side folding of the insert it is essential for approximately centrally aligned zones of different thicknesses of the material thickness to be present. The thin zones form the foot of the wings, whilst the thick zones form the head of the

wings. The spacing of the thin zones from the centre of the insert determines the beginning of the start of the wings. The material thickness in any case rises continuously, namely up to about 150% of the basic thickness, i.e. of the least material thickness.

The detonation wave guidance for the transformation of the metal cover into a projectile is based on conventional measures, such as multiple detonation of the explosive, inert substance inserts or cavities in the explosive.

Exemplified embodiments of the invention are shown in the drawings.

Figs. 1 to 3 show differently designed inserts in two views and in cross-section;

Fig. 4 shows the transformation of an insert into a projectile from the initial state as far as the end state.

In accordance with Figures 1a to 1c, an insert 1 is designed as a spherical cap 2. As a result of concavely arched recesses 3 in the convex side of the insert the material thickness extends - considered in the circumferential

direction - in an undulatory shape 4. In the zone 5, which is at the same time the axis of symmetry for the recess 3, the material thickness 6 is constant. In the zone 7, in which the two recesses 3 are contiguous, the material thickness 8 decreases in the centripetal direction 9. The original insert without worked-in recesses 3 is indicated in Figure 1c by a dot-dash line 1a.

In accordance with Figures 2a to 2c, an insert 15 is designed as a spherical cap 16. Concavely arched recesses 1b in the convex side of the insert lie at a spacing 17 from the centre 18. The recesses 1b bound a region 19 having a constant material thickness. In the zone 20 the material thickness 21 is constant. In a zone 22 the material thickness 23 increases in the centripetal direction. The original shape and thickness of the insert is indicated by a dot-dash line 15a.

In accordance with Figures 3a to 3c, an insert 35 is designed as a spherical cap 36. Recesses 37 in the concave side of the insert lie in accordance with the spacing 17 shown in Figure 2b from the centre 18.

The remaining features correspond to the features in

accordance with Figures 2a to 2c. The original material thickness 38 of the insert 35 is evident from Figure 3.

In accordance with Figures 4a to 4c, the shaping of an explosive-shaped projectile 40 from the insert 1 or respectively 15 or respectively 25 is shown in two stages (Figures 4b, 4c). The said insert consisting of a suitable material is arranged with an explosive charge 41 in a housing 42 with a detonating device 43. After detonation of the explosive charge 41, the insert 1; 15; 35 is inverted in a cap-shaped manner (dot-dash line 45) and is given the intermediate shape 40a with pre-shaped wings 47a which is evident in accordance with Figure 4b.

In accordance with Figure 4c the projectile 40 with the wings 47 is already transformed. The wings 47 extend approximately over 2/3rds of the length 48 of the projectile 40 as from approximately the spacing 17 from the earlier centre 18, now the projectile nose 50. The zones 5 form in each case the foot 51 of the wing 47. The zones 7 form the head 52. Besides the described exemplified embodiments, other shapes of inserts, such as conical inserts, can also be used. The geometry of the basic shape of the insert is arbitrary, for example spherical cap with shallow cone or

a combination of shallow cone and spherical cap. Also a degressive or progressive basic shape is possible. The projectile can, with an appropriate number of zones of different material thicknesses, have 3 or 4 or 6 or 8 wings.



CLAIMS

1. A projectile-forming explosive-charge insert (1,15,35) with a material thickness (8,23) which is non-constant in the centripetal direction (9) characterised in that it has zones (5,20) which extend centripetally in a peripherally staggered manner and which have a material thickness which is constant in the centripetal direction (9) and which alternate - merging into those - with zones (7,22) of non-constant material thickness (8,23) which also extend centripetally.
2. An insert according to claim 1, characterised in that a bevel shape is formed by centrically (18) aligned, regularly arranged, shallow recesses (3, 1b,37).
3. An insert according to claim 1, characterised in that the bevel shape is formed by shallowly arched recesses (1b,37) which are arranged at the circumference and which butt laterally against one another.
4. An insert according to claim 1, characterised in that the zones are formed by recesses (3) which are contiguous in the centre (18) of the insert (1).



(20)

5. An insert according to claim 1, characterised in that the zones are formed by recesses (1b, 37) the inner edge regions of which lie at a spacing (17) from the centre (18).
6. An insert according to claim 1, characterised in that the material thickness (6,8,21,23) - considered in the circumferential direction of the insert (1,15,35) - increases and decreases in an undulatory manner in the region of recesses (3,1b,37).
7. An insert according to claim 1, characterised in that recesses (3,1b) are arranged on a convex side of the insert (1,15).
8. An insert according to claim 1, characterised in that recesses (37) are arranged on a concave side of the insert (35).
9. An insert according to claim 1, characterised in that in the regions of recesses (3,1b,37) the material thickness (6,23) increases in the centripetal direction (9) or increases save for a centre region (18) which has a material thickness (21,38) which remains constant.



10. An insert according to claim 1, characterised in that a bevel shape is formed by eccentrically aligned, regularly arranged, shallow recesses or cross-sectional weakenings.