

DESCRIPTION

Liner

5 In insensitive artillery munitions, there is no direct contact between the insensitive explosive (IHE) and the projectile wall, in order to suppress the creation of thermal stresses caused by the different thermal expansions of the IHE and the projectile casing. A
10 liner, in general a plastic bag, is therefore introduced between the two into the projectile casing. The IHE is then poured in and cured.

EP 1 338 860 B1 discloses a method for production of a
15 large-caliber explosive projectile, and an explosive projectile produced using this method. In this case, a liner comprising a plastic casing composed of an elastic material is proposed in order that the volume of the explosive charge, which changes when temperature
20 fluctuations occur, is held by the elastic plastic casing. The liner is introduced through a mouth hole, which is normally used to hold the nose fuze, in the folded-together or pressed-together form. In the unfolded state, this plastic casing, which is in the
25 form of a bag, corresponds to the dimensions of the interior of the explosive projectile.

In some cases, the liner is not stiff enough to make it possible to compensate for the natural thermal
30 expansions which occur as a result of the expansion of the explosive charge. As a result of the large amount of thermal expansion, the explosive charge contracts and expands through several millimeters when it is cooled down/heated. The liner contracts with the
35 explosive charge, but does not expand with it to the same extent. This results in the liner being shifted on the explosive charge. The liner is shifted to the rear relative to the charge over a large number of

temperature cycles, as a result of which the explosive charge may be partially exposed.

The purpose of the invention in this case is to prevent
5 the liner from being shifted on the explosive charge.

The object is achieved by the features of patent claim 1. Advantageous refinements are specified in the dependant claims.

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The invention is based on the idea of including or incorporating a type of bead or stud in the liner, which provides an interlock with the charge front edge or in the charge.

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DE 1 812 462 A1 admittedly discloses a projectile with a fragmentation casing in which an explosive charge which is surrounded by a film is located and this film, which may be composed of steel, copper or plastic, has
20 a number of elongated indentations which are arranged in a row and extend in the longitudinal direction of the projectile, but these are used to form small shaped charges which are directed towards a cylindrical fragmentation casing which surrounds the film with the
25 explosive charge. When the explosive body detonates, the small shaped charges cut notches in the fragmentation casing and break the casing into fragments along these notches. The size of the fragments corresponds to the distances between the
30 indentations in a row, and to the distances between the rows. There is no intention of using the film for fixing with respect to the explosive charge.

In this case, the bead may be circumferential. If the
35 liner is introduced into the projectile casing in a folded form, the circumferential bead may be segmented. The studs which are created in this case likewise have very high dimensional stiffness, and the spaces between

them allow the liner to be folded easily.

In order to increase the dimensional stiffness of the studs, it is worthwhile deliberately setting the
5 stiffness of the studs, for example, by the wall thickness/material thickness being reinforced in the area of the studs. A variation is also possible by means of the width and the depth of the bead.

10 It has also been found to be advantageous to incorporate a plurality of rows of beads or studs in the liner.

The studs or beads can be incorporated in the liner,
15 during its production, by a simple modification to the liner tool.

The invention will be explained in more detail with reference to one exemplary embodiment and using the
20 drawing, in which:

Figure 1 shows a partial view of a projectile with a liner which has a bead,

Figure a shows a slightly enlarged illustration of the
25 bead from Figure 1,

Figure 2 shows a partial view of the projectile with a liner which has at least two beads.

Figure 1 shows, in a detail, a projectile 1 having a
30 projectile casing 2, a liner 3 which is located between the projectile casing and an explosive charge 4. In order to prevent the liner 3 from sliding on the explosive charge 4, the liner 3 has a bead/stud 5 which is shaped inward at a point L1 which is defined with
35 respect to the explosive surface (Figure 1a). The bead 5 is designed to be sufficiently stiff that the liner 3 rests in an interlocking manner on the front edge of the explosive charge 4, immediately or after a small

number of temperature cycles, depending on the filling level of the explosive charge 4.

Figure 2 shows the projectile 1 with more than one
5 formed bead or stud 5 (Figure 2a). The further bead 6
is in this case incorporated in the liner 3 with a
length L2 which is defined with respect to the
explosive surface, and makes it possible for the liner
3 to be hooked to the explosive charge 4 during the
10 casting process itself, and thus to be fixed from the
start.

In principle, it can be assumed here that, in this case
as well, an insensitive explosive charge 4 is poured
15 into the artillery explosive projectile 1. The liner 3,
in the form of an elastic rubber-like plastic casing,
is used in order to prevent the explosive charge 4 from
adhering to the inner wall of the projectile casing 2.
It is inserted into the projectile casing 2 through a
20 mouth hole 7. The insensitive explosive 4 comprises
explosive and a plastic-binder system with further
additives. This is poured into the liner 3, and is
cured therein. The cured, formed explosive, thus forms
the plastic-bonded explosive charge 4. The explosive
25 charge 4 has a coefficient of thermal expansion which
is greater by a factor of 8 to 12 than that of the
projectile casing 2, which is composed of steel.

Patent Claims

1. A liner (3), arranged between a projectile casing
(2) of a projectile (1) and an explosive charge
5 (4) in order to prevent contact between the
explosive charge (4) and the projectile casing,
composed of a plastic, characterized in that at
least a bead or stud (5, 6) is included in the
liner (3) and, formed inward, can be hooked to the
10 explosive charge (4).
2. The liner as claimed in claim 1, characterized in
that a first bead/stud (5) can be arranged at a
defined point (L1) from the mouth hole (7) in the
15 liner (3), such that this can be hooked onto or
can rest on the front edge of the explosive charge
(4) immediately or after a number of temperature
cycles.
- 20 3. The liner as claimed in claim 1 or 2,
characterized in that the further bead (6) can be
arranged at a further defined point (L2) from the
mouth hole (7) in the liner (3) such that the
liner (3) can be hooked integrally to the
25 explosive charge (4) during casting.
4. The liner as claimed in one of claims 1 to 3,
characterized in that the material thickness (t)
is reinforced in the area of the stud / of the at
30 least one bead (5, 6).