whose melting temperature is lower than the ignition temperature of the pyrotechnic igniter and the propulsive charge of the projectile.

[00042] In another embodiment of the cartridge munition of the invention, the pressure-tight assembly is removable by threaded or other mechanical means.

[00043] For a full understanding of the present invention, reference should now be made to the following detailed description of the preferred embodiments of the invention as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[00044] FIG. 1 is a longitudinal section through a cartridge munition consisting of a projectile and a cartridge shell that incorporates a propulsion chamber with a propulsive charge whereby, according to the invention, a non-fusible rupturable member and pressure-relief apertures are provided between the propulsion chamber and the outer wall of the cartridge shell;

[00045] FIG. 2 is a partial schematic representation of second embodiment of a cartridge munition according to the invention where the pressure relief apertures extend to the lateral surfaces of the cartridge shell; and

[00046] FIG. ~~3~~2 is a partial schematic representation of seconda ~~third~~ embodiment of a cartridge munition according to the invention where the pressure relief apertures extend to the lateral surfaces of the cartridge shell, ~~.~~ FIG. ~~3A~~2A is ~~a detail~~

~~thereof.~~identical to FIG. 2 with the exception that the non-fusable rupturable member is made from the cartridge shell material by incomplete penetration of the pressure relief apertures through the material.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[00047] The preferred embodiments of the present invention will now be described with reference to FIGS. 1 to 3 of the drawings. Identical elements in the various figures are designated with the same reference numerals.

[00048] A cartridge munition 2 shown in FIG. 1 consists of a projectile 4 and a cartridge shell 6. Cartridge shell 6 includes a propulsion chamber 10 in which a propulsive charge 12 is positioned.

[00049] Cartridge 2 possesses a caliber of from 40 mm, for example, and is fired from a tube weapon (not shown) with a twist, for which purpose the projectile possesses a guide- or twist-band (indicated only).

[00050] Propulsive charge 12 is ignited pyrotechnically by means of an igniter cap 30 whereby igniter cap 30 is mounted in the center of the base 32 of cartridge shell 6.

[00051] Passages are provided between the propulsion chamber 10 and base 32 of cartridge shell 6. Here, conical channels 34 decrease in size in the direction of base 32 of cartridge shell 6. Channels 34 possess a diameter of 7 mm for a 40 mm-caliber projectile, for example, and narrow down to about 6 mm.

[00059] FIG. 2 is a schematic representation of a partial cross-sectional view of a cartridge shell 6 representing another embodiment of the invention. Channels 34 with fusible material 36 extend radially to the outer perimeter 42 of cartridge shell 6. Disks or caps 38, or optionally an annular ring comprising the relief member (not shown), are positioned between fusible metal 36 and propulsive charge 12. In this embodiment there can be from two to four channels 34 symmetrically arranged around cartridge 6. FIG. 2A is identical to FIG. 2 except that in this case the non-fusible, rupturable material 38 has been formed in the cartridge shell 6 by incomplete penetration of the channels 34.

[00060] FIG. 3 is a partial schematic representation of another embodiment of the invention. In the base 50 of cartridge shell 6 each cylindrical channel 54 with threads 56 receives a cylindrical insert 60 having reciprocal threads ~~62~~. Each cylindrical insert 60 has a conical interior space which is filled with ~~shape to receive~~ fusible material 66. The outer, open end of the interior space is closed by a non-fusible metal plug 74 that covers the fusible material 66. Also, each cylindrical insert 60 has a recess 68 that accommodates ~~accomodates~~ a non-fusible, rupturable disk 70 and a sealing O-ring 72. When cylindrical insert 60 is screwed into position within cylindrical channel 54, sealing O-ring 72 will be deformed and disk 70 will be sealingly adjacent propulsion charge 12. The arrangement can perhaps be better appreciated in the detail of FIG. 3A.

[00061] In this embodiment there can be from two to four channels 54 symmetrically arranged around cartridge shell 6.

[00062] The cartridges in FIGS. 2 and 3 may also be fired in the same way as a conventional high velocity cartridge. In case of fire or similar problem, the function is the same as described by FIG. 1.

[00063] It is also possible, of course, to use other low-melting-point materials as fusible material 36 instead of the bismuth/tin alloy mentioned as long as it is strong enough to seal the pressure-relief channels completely so that a normal shot is possible from a tube weapon.

[00064] There has thus been shown and described a novel cartridge munition, particularly one which fulfills all the objects and advantages sought therefor. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention, which is to be limited only by the claims which follow.

WE CLAIM:

1. In a cartridge munition comprising a cartridge shell and a projectile inserted into the cartridge shell and mechanically connected to the cartridge shall, wherein a pyrotechnic propulsive charge is located in a propulsion chamber of the cartridge shell that is ignited by means of a pyrotechnic igniter, and whose propulsive gases exert a force on the base of the projectile when they burn, by means of which the projectile is driven out of the cartridge shell when the munition is chambered in a gun barrel, and wherein at least one passage exits from the propulsion chamber through the cartridge shell that ~~are~~ is substantially filled with a fusible, solid, pressure-tight material whose melting temperature is lower than the ignition temperatures of the pyrotechnic igniter and the propulsive charge of the projectile, the improvement wherein at least one non-fusible, rupturable member is positioned and forms a flat face between the fusible~~,~~ solid~~, pressure-tight~~ material and the propulsive charge in the propulsion chamber, and wherein a non-fusible plug is disposed in the passage containing the fusible material on the side opposite to the rupturable member, said rupturable member and said fusible solid material together having sufficient strength to withstand operating pressures within the propulsion chamber when the projectile is fired out of the cartridge shell, said rupturable material being configured to rupture and release gases from said propulsion chamber when said fusible material has melted and upon ignition of said propulsive charge when the munition is not chambered.

2. The cartridge munition of claim 1, wherein the fusible solid material is a fusible metal.

3. The cartridge munition of claim 1, wherein the fusible solid material is an alloy of at least bismuth and tin or bismuth and lead.

4. The cartridge munition of claim 3, wherein the fusible solid material is a bismuth/tin alloy with from about 30 to about 40 % by weight of bismuth and from about 60 to about 70 % by weight of tin, having a melting point of from about 140°C. to about 175°C.

5. The cartridge munition of claim 1, wherein the passages are channels that extend from the base of the propulsion chamber to the outer base of the cartridge shell.

6. The cartridge munition of claim 5, wherein the channels are positioned around the igniter of the propulsive charge.

7. The cartridge munition of claim 5, wherein the channels narrow as they progress from the base of the propulsion chamber to the outer base of the cartridge shell.

8. The cartridge munition of claim 1, wherein each non-fusible, rupturable member is a disk or cap or form an annular ring.

9. The cartridge munition of claim 1, wherein each non-fusible, rupturable member is scored or weakened.

10. The cartridge munition of claim 1, wherein each non-fusible, rupturable member is made of a metal or a rigid polymeric material.

11. The cartridge munition of claim 10, wherein the metal is copper, steel, stainless steel, aluminum, or brass.

12. The cartridge munition of claim 10, wherein the polymeric material is a polycarbonate or polystyrene polymer or copolymer.

13. The cartridge munition of claim 1, wherein at least one of the at least one passages exits from the propulsion chamber through a sidewall of the cartridge shell.

14. The cartridge munition of claim 1, wherein the rupturable~~rupture~~ member comprises a solid material without sufficient strength, ~~to sustain normal operating pressures~~ in the absence of additional mechanical support, to withstand the operating pressures within the propulsion chamber when the projectile is fired out of the cartridge shell..

15. The cartridge munition of claim 1, wherein the rupturable ~~rupture~~ member comprises ~~a~~ solid material that has been modified such that, ~~to prevent sustaining normal operating pressures~~ in the absence of additional mechanical support, it cannot withstand the operating pressures within the propulsion chamber when the projectile is fired out of the cartridge shell.

16. The cartridge munition of claim 1, wherein the rupturable~~rupture~~ member is made from the cartridge shell~~casing~~ material by incomplete penetration of at least one passage exit.

17. The cartridge munition of claim 1, wherein each passage is filled with a pressure-tight assembly comprising a solid, non-fusible rupture disk or cap that is mechanically

reinforced by a fusible, solid material whose melting temperature is lower than the ignition temperature of the pyrotechnic igniter and the propulsive charge of the projectile.

18. The cartridge munition of claim 1, wherein the pressure-tight assembly is removable by threaded or other mechanical means.

19. The cartridge munition of claim 1, wherein said non-fusible plug is metal.