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(54) **NOISE ATTENUATION DEVICE**

(57) This invention relates to a noise attenuation device and in particular a device which provides an increased performance in the range of a mortar system.

A noise attenuation device suitable for use on a munition barrel, said device comprising an barrel extension portion, at a first end of said barrel extension portion there is a tapered portion which tapers outwardly from said barrel extension portion, at a second end of the barrel extension portion a connector to secure the device onto a munition barrel.

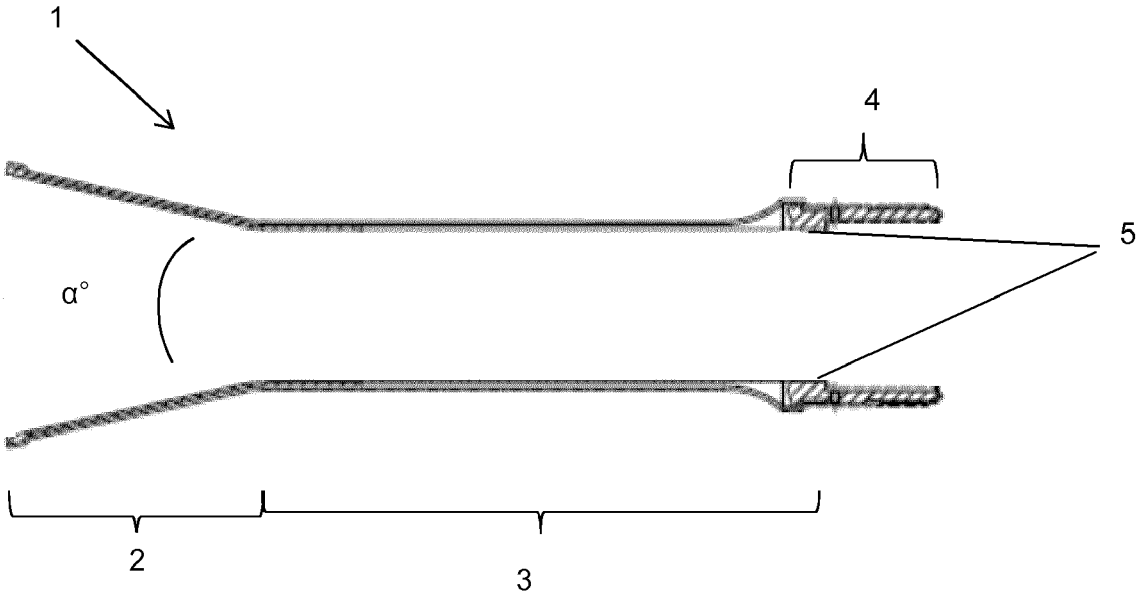

Fig 1

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a noise attenuation device and in particular a device which provides an increased performance in the range of a mortar system.

BACKGROUND

[0002] Blast attenuation devices such as muzzle brakes are well known in the art. They typically provide a means of allowing the rapid dispersion of the hot gases. Further features on these device is that they use apertures, such as slits or holes to allow the gases to disperse radially outwardly, to reduce the recoil of the barrel and attached ordnance.

SUMMARY OF THE INVENTION

[0003] In a first aspect, the present invention provides a noise attenuation device suitable for use on a munition barrel, said device comprising an barrel extension portion, at a first end of said barrel extension portion there is a tapered portion which tapers outwardly from said barrel extension portion, at a second end of the barrel extension portion a connector to secure the device onto a munition barrel.

[0004] The tapered portion may be is frustroconical, cupola, parabola, flared portion, to allow the controlled dispersion of the gases produced as the munition leaves the barrel.

[0005] Detailed optimised modelling has found that when the tapered portion is a frustroconical portion, has a cone angle $\alpha°$ in the range of 22° to 28°, highly preferably a cone angle of substantially 25°.

[0006] Preferably the height of the tapered portion is in the range of from 5cm to 30cm, more preferably in the range of 10cm to 20 cm more preferably the height of the frustroconical portion is in the range of 10 cm to 20 cm, most preferably 13.34cm.

[0007] The tapered portion may have sides which may be substantially straight, parabolic, curved, trumpet shaped sides, in a highly preferred arrangement the tapered portion has substantially straight sides.

[0008] The frustroconical portion has a base. The plane of the base may be substantially perpendicular to the plane of the barrel extension portion or it may be an elliptical/parabolic conic section, or slant cut. The base may have any shaped cross section, such as for example elliptical, circular, square, highly preferably a right angled frustrated cone with a substantially circular base.

[0009] The tapered portion comprises an inner surface and an outer surface, the inner surface may comprise a textured surface, such as for example concave convex portions, such as for example ridges, grooves, voids, such as to alter the flow of the combustion gases.

[0010] The inner surface of the tapered portion may comprise a coating or layer, to alter the friction of the surface, such as paints, polymers etc.

[0011] The barrel extension portion is a tube with an internal diameter (bore) substantially the same as the internal diameter(bore) as the munition barrel to which it is attached, such that the munition to be launched retains substantially the same gas tight seal in the barrel extension portion. In a preferred arrangement the barrel extension portion has a length in the range of from 10 cm to 60cm, more preferably 30 cm to 50cm, more preferably 45cm.

[0012] The device may be manufactured from any suitable material, such as a metal, polymer, composite, preferably a metal, preferably steel. Preferably the barrel extension portion and taper are selected from the same material.

[0013] The barrel extension portion, when deployed on the munition barrel, provides a temporary increase in overall barrel length, thereby increasing the time that the munition experiences the impulse from the hot expanding gases from the burning propellant. This may allow a reduction in the mass of propellant required to achieve the same range usually achievable with the munition's normal propellant mass. The reduction of propellant required to achieve the current maximum range, reduces the blast pressure. The combination of reduced propellant mass munition and a device according to the invention comprising a tapered portion may provide a reduction in noise to operators located around the weapon.

[0014] The use of a device on a 81 mm standard mortar barrel in combination with an 81 mm mortar with 20% reduced propellant mass, has been demonstrated to provide a 5dB reduction in noise to operators located proximate to the device, whilst maintaining the required distance for the mortar bomb.

[0015] Ii has been shown that a device when attached to a munition barrel allows a reduced mass propellant munition to be launched and to achieve substantially the same range.

[0016] The connector must provide a gas tight seal between the device and the munition barrel. The connector and munition barrel may comprise co-operatively engaging surfaces, such as threads, collets, locking rings.

[0017] The tapered portion may be reversibly attached to the barrel extension portion, such that the device may be more conveniently stored.

[0018] According to a further aspect of the invention there is provided a munition system comprising a munition barrel, a munition capable of being launched via said barrel, and a noise attenuation device as defined herein, said attenuation device attached by a connector to said munition barrel, wherein the munition has a reduced mass of propellant. The reduction may be at least 1%wt, preferably at least 10%wt, more preferably in the range of 5 to 20%wt.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

Figure 1 a, b cross section of a noise reduction device, with a connector.

Figure 2a, 2b, show a side view of a mortar barrel with a noise reduction device attached thereto, and a mortar.

DETAILED DESCRIPTION

[0020] Turing to figure 1 there is provided a noise attenuation device 1, the device comprises a barrel extension portion 3. At a first end of the barrel extension portion 3 is a tapered portion 2, which is preferably in the form of a frustrated cone. The tapered portion 2, is tapered such that the sides expand outwardly as a function of distance from the barrel extension portion. The cone angle $\alpha°$ is 25°. At the second end of the barrel extension portion 3 is a connector 4. The connector 4 allows the barrel extension portion 3 to be connected to an existing munition barrel, such as a mortar barrel. The inner surface (bore) 5 of the barrel extension portion 3, should be substantially the same bore as the munition barrel to ensuring a gas tight seal with a munition progressing up the barrel extension portion.

[0021] Turing to fig 2a, there is provided a L16 81mm mortar 10, which has been in service since 1965. The mortar launcher 10 comprises a barrel portion 15, which is supported by a base plate 16, which may be sunk into the ground. The mortar launcher 10, is further supported by a bi-pod 17, to allow the mortar launcher 10 to be arranged at a specific elevation. At the open end of the mortar barrel 15, is located a noise reduction device 11. The noise reduction device 11 comprises a barrel extension portion 13. At a first end of the barrel extension portion 13 is a tapered portion 12, which is preferably in the form of a frustrated cone. The connector 14 reversibly connects the noise reduction device 11 to the open end of the barrel 15.

[0022] A mortar bomb 18 is then deposited down the elongate barrel portion 12 and barrel 15. It is essential that the elongate barrel portion 12 and barrel 15 are of substantially the same bore, (same inner diameters) such that the mortar bomb 18 forms a gas tight seal via the obturator 19, with the inner wall of the barrel 15 and elongate barrel portion 12.

Claims

1. A noise attenuation device suitable for use on a munition barrel, said device comprising an barrel extension portion, at a first end of said barrel extension portion there is a tapered portion which tapers outwardly from said barrel extension portion, at a second end of the barrel extension portion a connector to secure the device onto a munition barrel.

2. A device according to claim 1 wherein said tapered portion, is frustroconical, cupola, parabola, flared portion.

3. A device according to claim 2, wherein the frustroconical portion has a cone angle in the range of 22° to 28°

4. A device according to claim 3, wherein the frustroconical portion has a cone angle of substantially 25°.

5. A device according to any one of the preceding claims wherein the barrel extension portion has a length in the range of 30cm to 60cm.

5. A device according to any one of claims 2 to 4, wherein the height of the frustroconical portion is in the range of 10 cm to 17 cm.

6. A device according to any one of the preceding claims wherein the device when attached to a munition barrel allows a reduced mass propellant munition to be launched and to achieve substantially the same range.

7. A device according to any one of the preceding claims wherein the connector and munition barrel comprise co-operatively engaging surfaces.

8. A device according to any one of the preceding claims wherein the tapered portion is reversibly attached to the barrel extension portion

9. A munition system comprising a munition barrel, a munition capable of being launched via said barrel, and a noise attenuation device according to any one of the preceding claims, said attenuation device attached by a connector to said munition barrel, wherein the munition has a reduced mass of propellant.

10. A system according to claim 9, wherein the reduction of propellant is in the range of 5 to 20%wt.

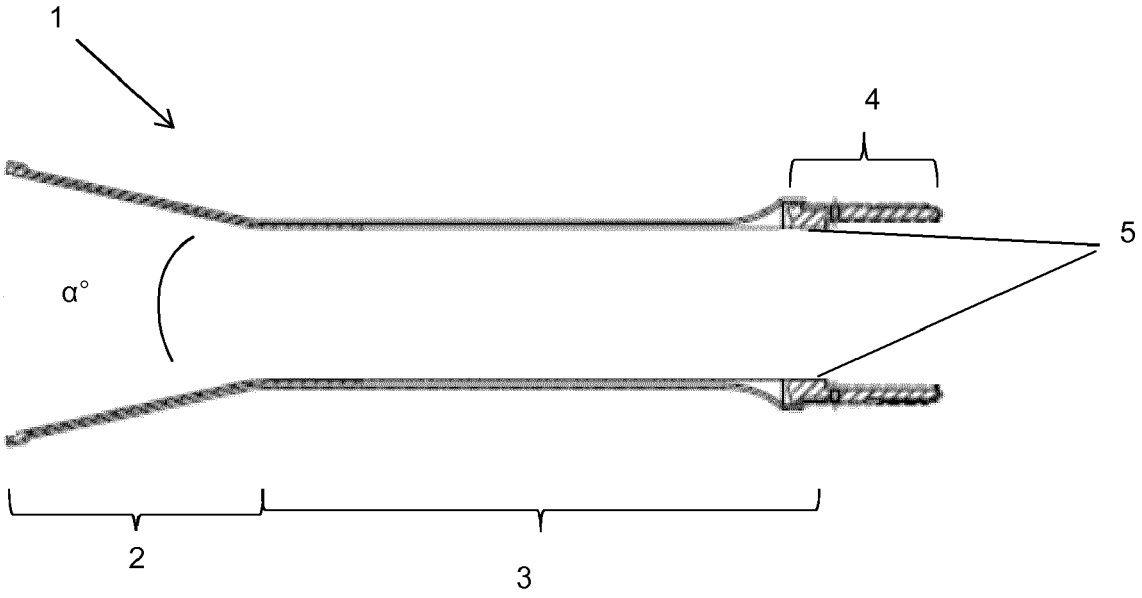

Fig 1

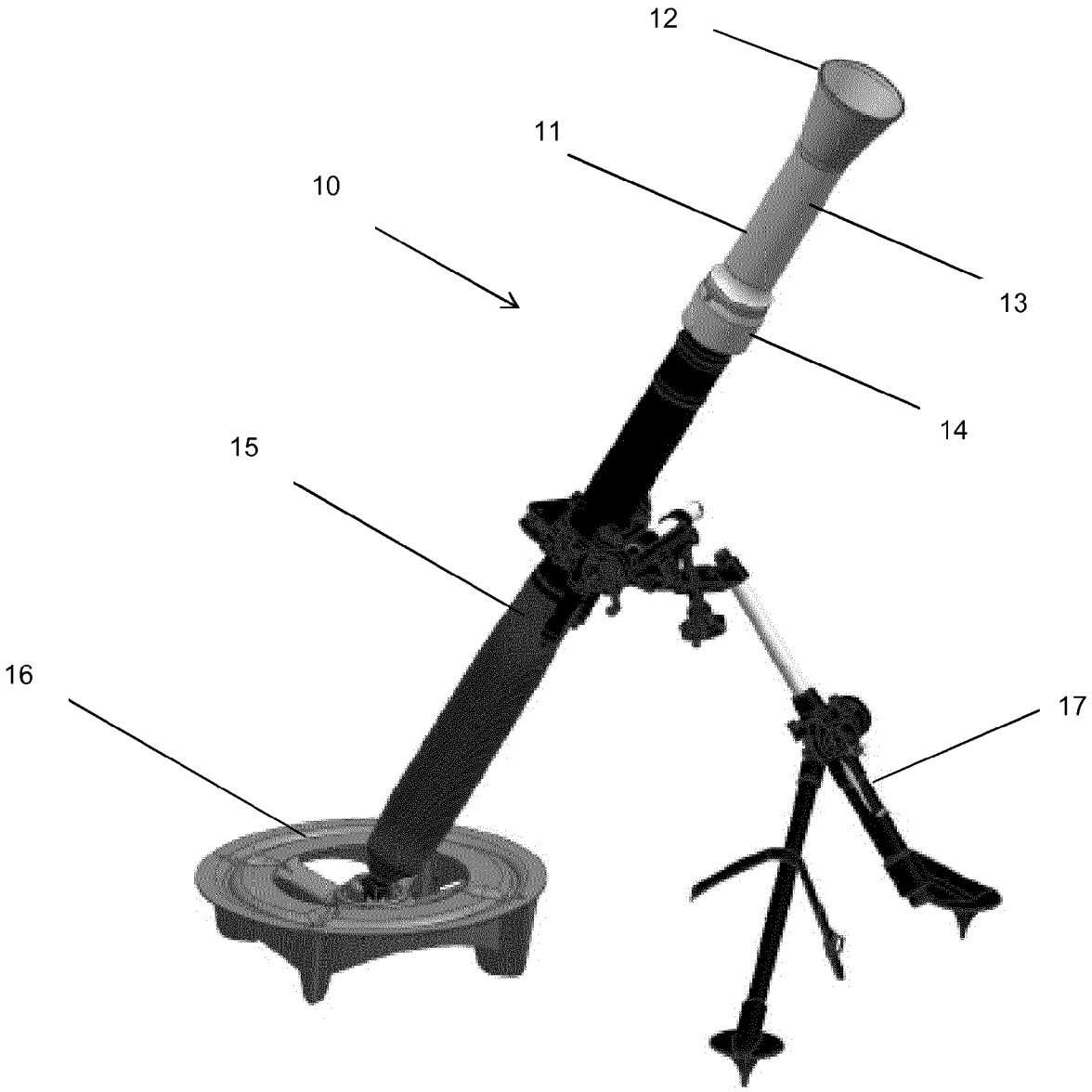

Fig 2a

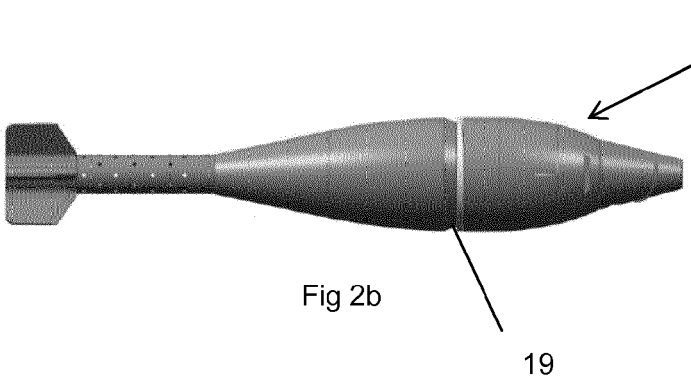

Fig 2b

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EUROPEAN SEARCH REPORT

Application Number
EP 16 27 5159

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 956 335 A2 (HONEYWELL INT INC [US]) 13 August 2008 (2008-08-13) * paragraph [0019]; figure 1 * -----	1-5,7-9	INV. F41A21/30 F41A21/32 F41A21/34
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X	US 6 308 608 B1 (EISENMAN MOSHE [IL]) 30 October 2001 (2001-10-30) * column 2, line 66 - column 3, line 39; claim 1; figures 1-3 * -----	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

F41A

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 November 2016	Beaufumé, Cédric

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 27 5159

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82