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(54) Super compressed detonation method and device to effect such detonation

(57) A method and apparatus (20) for high pressure compression of materials and for detonation of the compressed material by cylindrical implosion followed by an axial detonation to a detonation velocity several times that of TNT and a detonation pressure in excess of ten times that of TNT. The device provides a conical metal flyer shell (5) within which is disposed a cylindrical anvil (10) surrounded by explosive (7). The anvil (10) retains a sample material (11) to be compressed and detonated. A first detonation of explosive by impact of the flyer shell (5) generates a reverberating oblique shock wave system for sample compression. Axial detonation of the compressed sample (11) through any length of a sample (11) is achieved following the principal of matching the axial velocity and compression time of the oblique shock wave system to the detonation rate and induction delay time of the compressed sample (11). The method and apparatus (20) are also applicable to enhancing the effect of anti-armour and anti-hard-target munitions. The apparatus is also applicable to inert sample compression to the megabar range without using the axial detonation.

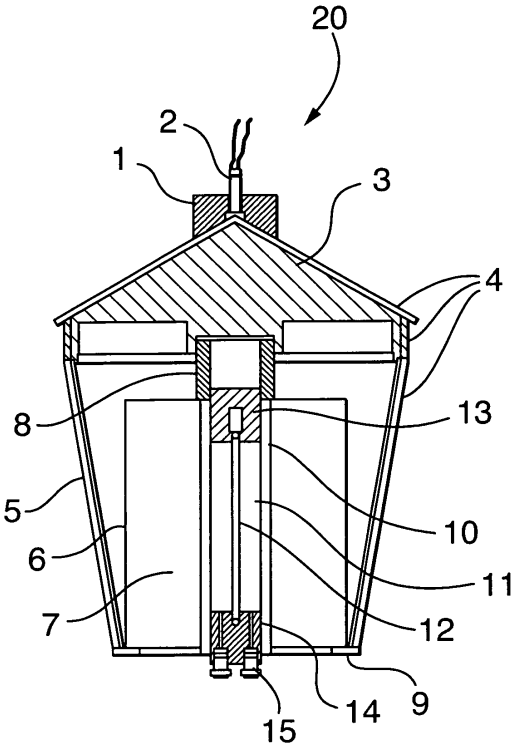

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 05 00 4978

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 061 824 A (CEA) 25 June 1971 (1971-06-25) * page 1, lines 1-9 * * page 2, line 21 - page 3, line 30 * * figure 1 *	1	F42B1/00
A	FUJIWARA K ET AL: "NEW METHOD OF GENERATING CYLINDRICAL IMPLODING SHOCKS USING A FLYER DISK" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 61, no. 26, 28 December 1992 (1992-12-28), pages 3110-3112, XP000334705 ISSN: 0003-6951 * page 3110, paragraph 3; figure 2 *	1	
A	US 5 024 159 A (WALLEY ET AL) 18 June 1991 (1991-06-18) * column 1, line 62 - column 2, line 8; figure 2 *	1	TECHNICAL FIELDS SEARCHED (IPC)
A	US 4 372 214 A (TOTON ET AL) 8 February 1983 (1983-02-08) * column 2, line 48 - column 3, line 54; figure 1 *	1	F42B F42D B01J

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	6 July 2005	Lostetter, Y

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-10

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-10

   Method for effecting physicochemical transformations in a material using super-compressed detonation.

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2. claim: 11

   Method for inducing reverberating shock waves for compressing a material exposed thereto.

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3. claims: 12-15

   Method for velocity-induction matching for maintaining super-compressed detonation in any length of a material.

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4. claim: 16

   Method for effecting anti-armour and anti-hard-target munitions.

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5. claims: 17-23

   Device for high pressure compression of materials and for detonation of super-compressed materials.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 00 4978

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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06-07-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2061824 A	25-06-1971	NONE	
US 5024159 A	18-06-1991	NONE	
US 4372214 A	08-02-1983	NONE	

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82