

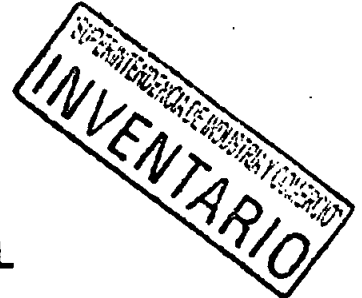


CSA238781

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



Organización CSA Ltda.



DELEGATURA PROPIEDAD INDUSTRIAL

División de Nuevas Creaciones

PCT

SOLICITUD

PATENTE DE INVENCION

ENTRADA EN FASE NACIONAL

08-45001

21. EXPEDIENTE No.

54. TITULO FORMULACIÓN EXPLOSIVA

51. CLASIFICACION INTERNACIONAL

71. SOLICITANTE CARBO-PRILL, INC.

DOMICILIO EVANSVILLE, IN, ESTADOS UNIDOS DE AMÉRICA

74. APODERADO JUAN PABLO CADENA SARMIENTO

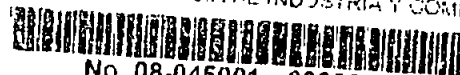
22. SANTAFE DE BOGOTA, D.C.

PETITORIO

AS: 107.092



SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 08-045001- -00000-0000

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Pag. 11 PATENTE/IIH Lvs 378 FASE NACIONAL
Act 411 PRESENTACION Folios 48

FORMULARIO ÚNICO DE SOLICITUD DE PATENTE PCT ENTRADA EN FASE NACIONAL

2 Jun 2008

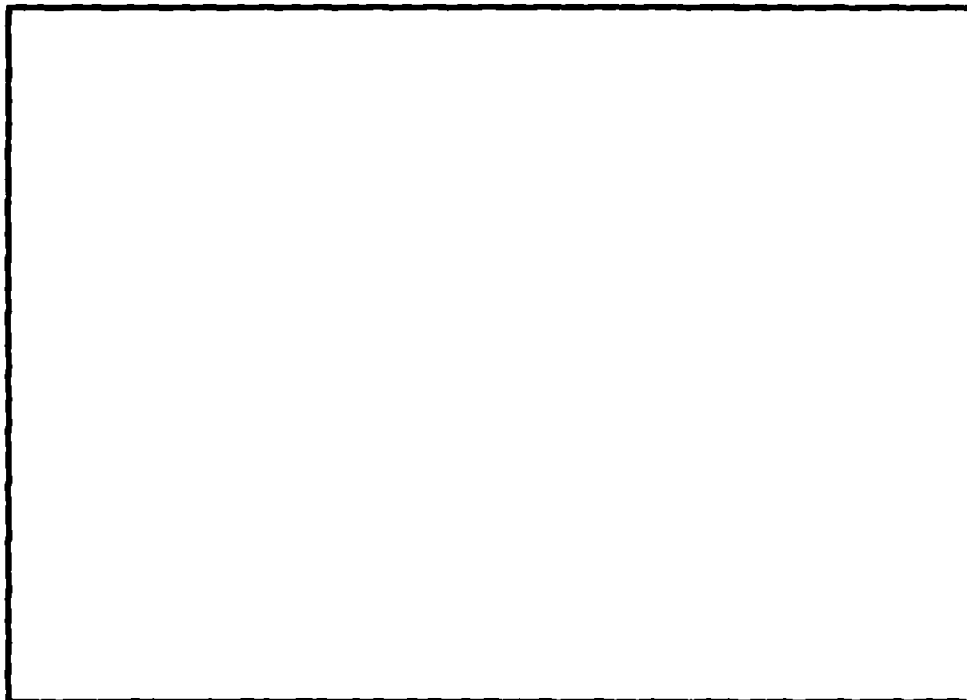
1 SOLICITUD DE:			
☒ Patente de Invención.		☐ Patente de Modelo de Utilidad.	
☒ Capítulo I.		☐ Capítulo II.	
2 SOLICITANTE (71)	Nombre: CARBO*PRILL, INC. Dirección: 528 Main Street, Suite 202, Evansville, IN 47708, Estados Unidos de América. Nacionalidad o Domicilio: Estados Unidos de América Lugar de Constitución: Estados Unidos de América Teléfono: Fax: E-mail:		IDENTIFICACIÓN C.C. ☐ NIT ☐ C.E. ☐ Otro ☐ Cual _____ Número _____
3 REPRESENTANTE O APODERADO	Nombre: JUAN PABLO CADENA SARMIENTO Dirección: Cra. 7 No. 71-21 Torre B – Piso 4, Bogotá, Colombia. Teléfono: 744-2200 Fax: 742-2200 E-mail:		IDENTIFICACIÓN C.C. ☒ NIT ☐ C.E. ☐ Otro ☐ Cual _____ Número 80.410.337 TP 57492
4 INVENTOR (ES) (72)	Nombre: Dennis R. WILZBACHER, Michael L. SCHIELE, John C. HARMAN. Dirección: 14649 Highway 41 North, Evansville, IN 47708, US; 14649 Highway 41 North, Evansville, IN 47708, US; 14649 Highway 41 North, Evansville, IN 47708, US (Respectivamente). Nacionalidad o Domicilio: Estados Unidos de América (Respectivamente).		
5 PCT (86)			
Solicitud Internacional No.		PCT/US2005/039617	Fecha 02-11-2005
Publicación Internacional No		WO 2007/053143 A1	Fecha 10-05-2007
6 Título (54): FORMULACIÓN EXPLOSIVA (ver folio 53)			
7 Clasificación Internacional (51): C06B 47/00			
8 Prioridad SI ☐ NO ☒	(33) País de Origen	(32) Fecha	(31) Número de Solicitud
9 Comprobante de pago No. 08-29,090 Fecha 02-05-2008			
Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.			

10

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud. \$501.000
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☐ Poderes, si fuere el caso.
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☐ Declaraciones
- ☒ Copia de la solicitud internacional. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA.
- ☐ Traducción del examen preliminar efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☐ Arte final 12x12.
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☒ Otros Tarjeta de Propietarios
Documentos PCT

11 FIGURA CARACTERÍSTICA:



12 Solicito la concesión de la patente.

NOMBRE: JUAN PABLO CADENA SARMIENTO

FIRMA:

C.C. 80.410.337 de Usaquén TP-57492 del C.S.J.

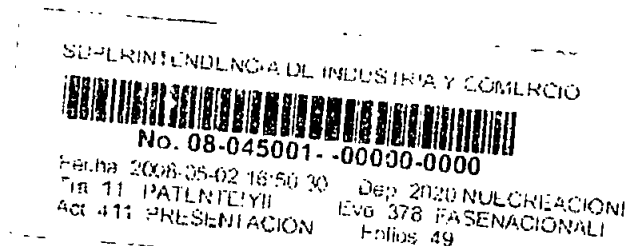
Instrucciones para la presentación de los anexos, ver reverso de esta página.

As 107092
3

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 08 - 29,090
FECHA : ABRIL 10 DE 2008



***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
ORIGARD & CASTRO LTDA	CONSIGNACION	BANCO DE BOGOTA	062754387	3164836	09/04/2008	17,025,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01	SOLICITUDES	
		1 TRAMITES DE SOL. DE PATENTE DE IN	501,000.00
		TOTAL :	\$ 501,000.00

SON: QUINIENTOS UN MIL PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

Se vede folo 4
bipole action

EXPLOSIVE FORMULATION

CROSS REFERENCES TO RELATED APPLICATIONS: U.S. Provisional Application for Patent No. 60/599,653, filed August 9, 2004, with title "Explosive Formulation" which is hereby incorporated by reference. Applicant claims priority pursuant to 35 U.S.C. Par. 119(e)(i).

Statement as to rights to inventions made under Federally sponsored research and development: Not Applicable

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates generally to the field of explosive compositions, and methods of making and using same. More particularly, the present invention is a multi- component explosive formulation which finds versatile use in blasting operations such as, but not limited to, mining operations and the like. Even more particularly, though not exclusively, the present invention relates to the manufacture and use of modified forms of Ammonium Nitrate Fuel Oil (ANFO) explosives which have been modified with the incorporation of a solid fuel material.

2. Brief Description of Prior Art.

Blasting operations in quarry mining and open pit mining conventionally use ANFO as the explosive. ANFO is an appropriate mixture of ammonium nitrate and fuel oil. While ANFO remains a popular explosive in the industry, it has

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inefficiencies, and is relatively expensive due to continually rising costs of its components.

Thus, there remains a need in the art for other explosive formulations which are safer to use and less costly than the present explosive compositions. As will be seen from the subsequent description, the preferred embodiments of the present invention overcome shortcomings of the prior art.

SUMMARY OF THE INVENTION

The present invention provides a multi-component explosive formulation that is ANFO explosives which has been modified with the incorporation of a solid fuel material. The present formulation is characterized by lower velocity of detonation, provides results as good as or better than conventional explosives and is less expensive than presently available explosive compositions.

Specifically, the present invention comprises an admixture of ammonium nitrate and less than 4% by weight (decreased from the conventional 6% by weight) of fuel oil. The carbon molecules in the fuel oil that are chemically necessary for an optimum blast are replaced in the current formulation with a solid fuel material characterized as (1) having a concentration of liptinite that is higher than normal coals, and (2) having a concentration of pseudovitrinite that is significantly lower than normal coals.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be illustrated on the basis of the following description of a preferred embodiment thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with the present invention, an explosive formulation is disclosed. The present invention relates generally to a multi- component explosive formulation which finds versatile use in blasting operations such as, but not limited to, mining operations and the like. However, as will be understood, the formulation can be applied to other blasting operations. Specifically, it will be noted that the present invention relates to the application of modified forms of Ammonium Nitrate Fuel Oil (ANFO) explosives which have been modified by the incorporation of a solid fuel material. In the broadest context, the explosive composition of the present invention consists of components configured and correlated with respect to each other so as to attain the desired objective.

The present invention provides an explosive formulation consisting of at least three components: a dry granular solid component which is an oxidizer, a liquid high-boiling point fuel oil or diesel or the like, and a solid fuel material.

Each component of the composition of the invention is individually not an explosive. As such, each component can be handled, shipped and stored as either oxidizers or flammable materials. Such classifications are more easily and less expensively shipped than explosives. However, as will be understood, these components, when mixed, form an explosive formulation which finds versatile use in blasting operations such as, but not limited to, mining operations and the like.

The first component of the composition of this invention is a dry component, which is an oxidizing compound. The preferred oxidizer is ammonium nitrate that is manufactured and delivered as a coated spheroid or prill that is in a

typical diameter of about .09 inches. The first component can be readily selected from among oxidizers conventionally used in the manufacture of explosive compositions to achieve desired properties.

The second component of the composition is a high-boiling point liquid component. In the preferred embodiment, the second component is a liquid fuel.

Conventional ANFO generally comprises a mixture of ammonium nitrate and 6% by weight of fuel oil. The current formulation comprises an admixture of the first dry component and less than 4% by weight of the liquid second component. As will be discussed, the carbon molecules contained in the fuel oil that are chemically necessary for an optimum blast are replaced in the current formulation with the composition's third component, a solid fuel material. As used herein, all weights and percent by weight are based on total weight of the formulation.

The second component can be readily selected from among high-boiling point liquid components conventionally used in the manufacture of explosive compositions to achieve desired properties.

The third component of the composition is a solid fuel material. The third component's main maceral component (approximately 75%) is vitrinite and also included are the liptinite macerals sporinite, cutinite and resinite. The inert macerals fusinite and semifusinite are also present in the third component. As used herein, the term maceral means those organic units that compose coal mass. As such, coal is composed of macerals which each have a distinct set of physical and chemical properties that control the behavior of coal.

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The third component is further characterized as follows: (1) the amount of liptinite macerals, particularly cutinite, are higher than normal, and (2) almost no pseudovitrinite (structured coalified wood) is present in the third component. More particular, the normal amount of liptinite macerals in coal is between 5 – 15% by weight of the coal. In contrast, the amount of liptinite macerals in the third component is approximately 20%. The vitrinite group generally includes two sub-groups namely matrix vitrinite, also known as desmovitrinite, and pseudovitrinite, also known as telovitrinite. The normal amount of vitrinite macerals in coal is similar to the amount of vitrinite macerals in the third component, approximately 75% by weight. However, of the total 75% by weight of vitrinite macerals found in coal, the normal amount of sub-group pseudovitrinite present is between 25-35%. In contrast, of the total 75% by weight of vitrinite macerals in the third component, there is little trace, near zero, amount of pseudovitrinite present.

Acceptable specimens of the third component are found in the Friendsville Coal Seam at the base of the Mattoon Geological Formation and within the McLeansboro Group of the Missourian Series of the Pennsylvanian Geologic System of sedimentary rock of Southeastern Illinois. However, alternate solid fuel materials having the characteristics as described above can be used.

The inherent chemical and physical properties of the third component, as described and used with the first and second components, allows for blasting velocities that match or closely match the natural resonant frequencies of those materials being blasted thereby utilizing only the energy required to fragment and move the rock, and do so in a safer more efficient manner.

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These components of the present formulation may be packaged in separate containers conventionally employed for the desired purpose. Mixing of the components can be accomplished using mixing means known in the art, and does not require mechanical agitation. As such, a motor-driven mixer is not required. Therefore, mixing these dry and liquid components to produce the explosive formulation can be accomplished just prior to the need for the explosive composition.

As discussed, the present invention comprises an admixture of the first component (the dry component) and less than 4% by weight of the liquid second component. The approximate 4% by weight in the present formulation represents a significant decrease in volume of the liquid component used when compared with the conventional 6% by weight use of prior art explosives. The carbon molecules in the second component chemically necessary for an optimum blast are replaced in the current formulation with the third component. Application of a lesser volume of the liquid second component as described reduces the cost of the present explosive formulation compared with presently available explosive compositions. Similarly, inclusion of the third component as discussed depletes the required volume of the first component which further reduces the cost of the present explosive formulation compared with presently available explosive compositions.

The blend ratio of the third component to ANFO is a calculation based on the estimated natural resonant frequency of the rock, shale or other material to be blasted. The third component can be blended in ranges of about 5% to 50% of the total weight of the formulation. The formulation is loaded and delayed, and the shot is initiated as the conventional ANFO method is known in the art.

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Examples of the invention will now be given.

There were three components in the blasting agents used in the test, ammonium nitrate mixed with four percent fuel oil by weight (ANFO-4), raw third component material and air washed third component material. As described, ANFO with only four percent oil was used because the third component material provides additional fuel to the blasting agent mixture. The third component material samples were minus 3/8 inch in size. The blends for each test were made using a powder truck equipped with two separate product bins and augers. The auger speed under each bin could be varied to achieve the appropriate blend. During testing, the ANFO-4 was placed in one bin and the third component material was placed in the second bin. Material from each bin was augered to a series of common collection augers that mix the blasting agents as they were transferred to the blast hole.

All of the blast holes drilled for the testing were 9 7/8 inches in diameter. On average the holes were 99 feet deep with 7 feet of backfill, 17 feet of stemming, and a 75 feet powder column. The ANFO-4 and washed third component material test holes were positioned in the first row along the highwall face so that if a misfire occurred there would be a minimal amount of material to re-shoot and move with a conventional shot. The raw third component material test holes were incorporated into a production shot and were placed in the first and second rows of the shot. The highwall face burdens ranged from 22 to 24 feet and all of the holes were spaced 24 feet apart. Each blast hole was initiated with a non-electric detonator and 16 ounce cast primer. The surface delay between holes ranged from 25 to 50 milliseconds with each blast having a 500 millisecond down-hole delay. The configuration of all the blast holes in the test is typical of the designs used in normal production shots.

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Testing began with a 4-hole shot of 100% ANFO-4, followed by three 4-hole shots with blends of 9.1% washed third component material and 90.9% ANFO-4, 21.1% washed third component material and 79.9% ANFO-4, and 29.8% washed third component material and 70.2% ANFO-4. The remaining blends namely 38.2% washed third component material and 61.8% ANFO-4, 51% washed third component material and 49% ANFO-4, 14.9% raw third component material and 85.1% ANFO-4, 27.4% raw third component material and 82.6% ANFO-4, 41.6% raw third component material and 68.4% ANFO-4, 45.3% raw third component material and 54.7% ANFO-4, and 55.7% raw third component material and 44.3% ANFO-4 were tested with the 2-hole shots. Data collected from each shot was used to produce a velocity trace. The velocity of detonation can be calculated by picking two points on the trace or by regression analysis of the entire trace. In this test, regression analysis rather than point-to-point data was used because it is believed it more accurately represents the test results. Results from the ANFO-4, and raw and washed third component material blends are represented in the table below.

Test No.	Average Blend			Detonation Velocities – R/W Regression Analysis				
	% Washed Third Component Material	% Raw Third Component Material	%ANFO4	Hole #1	Hole #2	Hole #3	Hole #4	Average
1	0.0%		100.0%	12,960	12,086	13,006	12,283	12,584
2	9.1%		90.9%	13,407	12,523	11,959	12,515	12,601
3	21.1%		78.9%	12,962	12,598	11,503	12,471	12,384
4	29.8%		70.2%	12,180	12,061	11,931	11,828	12,000
5	38.2%		61.8%	11,425	10,725			11,075
5	51.0%		49.0%			9,088	9,264	9,176
6		14.9%	85.1%	13,006	13,629			13,318
6		27.4%	72.6%	12,041	12,818			12,430
6		41.6%	58.4%	10,859	11,485			11,172
6		45.3%	54.7%	8,285	10,974			9,630

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ANFO-4 – The 100% ANFO-4 shot well and had an average velocity of defonation (VOD) of 12,584 fps. It was slightly underfueled and orange smoke was present at the end of the shot which is typical of that condition. The fragmentation and movement of shot rock was similar to production blasts using ANFO with 6% fuel. The ANFO-4 test was conducted to establish a bench mark velocity for subsequent shots.

Washed Third Component Material Blends – All of the washed blends tested shot well and had constant detonation velocities. There were no misfires. There was some white smoke or steam present and excess fuel continued to burn for an instant after the 51% blend was detonated. In all of the tests, the fragmentation and movement of shot rock was similar to production blasts using ANFO with 6% fuel oil although it appeared that there was a slight decrease in fragmentation and movement as the percentage of third component material exceeded 40%. As the percentage of third component material in the blend increased, the detonation velocity decreased. This relationship is almost linear. In general terms, a 1% increase in third component material decreased the VOD by 82 feet per second. The highest average velocity recorded was 12,601 fps for the 9.1% washed third component material and 78.9 ANFO-4 blend. The lowest was 9,176 fps for the 51% washed third component material and 49% ANFO-4 test.

Raw Third Component Material Blends – All of the raw third component material blends tested shot well and had constant detonation velocity. There were no misfires nor were there signs of incomplete combustion. The fragmentation and movement of shot rock were similar to the washed third component material results. As the percentage of raw third component material was increased, the

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detonation velocity decreased. On average, a 1% increase in third component material decreased the VOD by 122 feet per second which was higher than the washed third component material blends. The highest average velocity recorded was 13,318 fps for the 14.9% raw third component material and 85.1% ANFO-4 blend. The lowest was 8,361 fps for the 55.7% raw third component material and 44.3% ANFO-4 test.

Combined Results – The raw and washed third component material VOD test results were comparable. On average the raw third component material VOD's were slightly higher than the washed third component material's. This may have been due in part to the smaller size distribution of the raw third component material. 23.3% of the raw third component material was minus 28 mesh in size comparable to 8.1% for the washed third component material. The smaller size fractions are more readily consumed than larger third component material particles making the detonation process more efficient.

Not only does the formulation lower blasting costs, but application of the formulation produced comparable if not better fragmentation, with a higher effective casting of the blasted material. This results in safer mine conditions due to reduced flyrock occurrences.

Although the description above contains many specificities, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of the invention. For example, the present formulation was described with particular reference to the use of modified ANFO explosives in rock blasting, however it is to be noted that the present invention is not limited to the production and use of this type of explosive, but rather the scope of the present invention is more extensive so as to

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also include materials, modifications and uses other than those specifically described.

Further, it will be obvious that embodiments described may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the present invention.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

Claims

1 claim:

1. An explosive formulation comprising:
a dry granular solid component,
a liquid high-boiling point component, and
a solid fuel material, wherein said solid fuel material is characterized in that it contains a vitrinite maceral, liptinite maceral, and inert macerals fusinite and semifusinite, and wherein the amount of liptinite macerals is higher than normal, and wherein almost no pseudovitrinite is present in said solid fuel material.
2. The formulation as recited in Claim 1, wherein the dry granular solid component is an oxidizer.
3. The formulation as recited in Claim 2, wherein the oxidizer is ammonium nitrate.
4. The formulation as recited in Claim 1, wherein the liquid component is a liquid fuel oil.
5. The formulation as recited in Claim 4, wherein the amount of the liquid component is 4 weight percent.
6. The formulation as recited in Claim 1, wherein the amount of the vitrinite maceral in said solid fuel material is about 75 weight percent.
7. The formulation as recited in Claim 1, wherein said solid fuel material is present in the amount of about 5 to about 50 weight percent.
8. An explosive formulation comprising:
a dry granular solid oxidizer component,
a liquid high-boiling point component, and
a solid fuel material, wherein said explosive formulation is characterized in that the liquid component is not more than 4% by weight and wherein said fuel

material is coal containing vitrinite and liptinite macerals.

9. The formulation as recited in Claim 8, wherein the oxidizer is ammonium nitrate.

10. The formulation as recited in Claim 9, wherein the liquid component is a liquid fuel oil.

11. The formulation as recited in Claim 10, wherein the amount of vitrinite macerals in said solid fuel material is about 75 weight percent of the solid fuel material.

12. The formulation as recited in Claim 11, wherein said solid fuel material is present in the amount of about 5 to about 50 weight percent.

13. An explosive admixture comprising a dry granular solid oxidizer component, a liquid fuel oil component, and a solid fuel material, wherein said explosive admixture is characterized in that the liquid fuel oil is not more than 4% by weight of the admixture and wherein said solid fuel material is coal containing vitrinite and liptinite materials.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/39617

A. CLASSIFICATION OF SUBJECT MATTER

IPC: C06B 47/00(2007.01)

USPC: 149/1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 149/1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST text search: ANFO, coal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,505,800 A (HARRIES et al) 09 April 1996 (09.04.1996), col. 2 and 3	1-13

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier application or patent published on or after the international filing date
- "C" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z"

document member of the same patent family

Date of the actual completion of the international search

13 November 2006 (13.11.2006)

Date of mailing of the international search report

18 DEC 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

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22

(12) SOLICITUD INTERNACIONAL PUBLICADA SEGÚN EL TRATADO DE COOPERACIÓN INTERNACIONAL
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(19) Organización Mundial de Propiedad Intelectual
Oficina Internacional



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PCT

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- (71) Solicitante (para todos los países destinatarios con excepción de US): CARBO*PRILL, INC. [US/US], 528 Main Street, Suite 202, Evansville, IN 47708 (US)

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- (81) Países designados (a menos que se indique lo contrario para cada clase de protección disponible): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Países designados (a menos que se indique lo contrario para cada clase de protección disponible): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasiática (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Europea (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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— con informe internacional de búsqueda

Para códigos de dos letras y otras abreviaturas, remítase a las "Notas Guía sobre Códigos y Abreviaturas" que aparece al comienzo de cada edición regular del Boletín Oficial PCT.

(54) Título: FORMULACIÓN EXPLOSIVA

(57) Extracto: Una formulación explosiva usada en operaciones de voladura tales como, pero no limitadas a, operaciones de minería y similares. La formulación se compone de una forma modificada de explosivos de Nitrato de Amonio y Petróleo Combustible (ANFO) que se han modificado por la incorporación de un material combustible sólido. La formulación contiene un componente sólido granular seco, un componente líquido con un punto de ebullición elevado de alrededor de 4% en peso y un material combustible sólido. El material combustible sólido contiene macerales vitrinita, macerales liptinita y macerales inertes fusinita y semifusinita, y se caracteriza por (1) tener un concentrado de liptinita que es más alto que los carbones normales, (2) tener un concentrado de pseudovitrinita que es significativamente más bajo que los carbones normales.

WO 2007/053143 A1

FORMULACIÓN EXPLOSIVA

REFERENCIAS CRUZADAS A SOLICITUDES RELACIONADAS:
Solicitud Provisional de los Estados Unidos de la Patente No. 60/599,653, presentada el 9 de agosto de 2004, con el título "Formulación Explosiva" que se incorpora aquí por referencia. El solicitante reivindica prioridad de acuerdo con 35 U.S.C. Par. 119(e)(i).

Declaración con respecto a derechos sobre invenciones realizadas bajo Investigación & Desarrollo patrocinados con recursos federales: No Aplicable

ANTECEDENTES DE LA INVENCIÓN

1. Campo de la Invención.

La presente invención se refiere generalmente al campo de composiciones explosivas y a métodos de prepararlas y emplearlas. Más particularmente, la presente invención es una formulación explosiva multi-componente que encuentra un uso versátil en operaciones de voladura tales como, pero sin limitación, operaciones de minería y similares. Aún más particularmente, aunque no en forma exclusiva, la presente invención se refiere a la fabricación y empleo de formas modificadas de explosivos de Nitrato de Amonio y Petróleo Combustible (ANFO), que se han modificado con la incorporación de un material combustible sólido.

2. Breve Descripción del Arte Previo.

Las operaciones de dinamitado en minería de canteras y explotación a cielo abierto utilizan convencionalmente ANFO como explosivo. El ANFO es una mezcla apropiada de nitrato de amonio y petróleo combustible. Aunque el ANFO sigue siendo un explosivo popular en la industria, presenta

ineficiencias y es relativamente costoso, debido a los costos continuamente crecientes de sus componentes.

En consecuencia, subsiste una necesidad en el arte de otras formulaciones explosivas que sean más seguras de usar y menos costosas que las actuales composiciones explosivas. Como se observará de la siguiente descripción, las incorporaciones preferidas de la presente invención superan las desventajas del arte previo.

SUMARIO DE LA INVENCION

La presente invención provee una formulación explosiva multi-componente conformada por explosivos ANFO y que se ha modificada con la incorporación de un material combustible sólido. La presente formulación se caracteriza por una menor velocidad de detonación, ofrece resultados tan buenos o mejores que los explosivos convencionales y es menos costosa que las composiciones explosivas actualmente disponibles.

Específicamente, la presente invención contiene una mezcla de nitrato de amonio y menos del 4% en peso (menos de 6% convencional en peso) de petróleo combustible. Las moléculas de carbono en el petróleo combustible que son químicamente necesarias para una explosión óptima se reemplazan en la formulación actual con un material combustible sólido, caracterizado por (1) tener una concentración de liptinita que es más alta que los carbones normales, y por (2) tener una concentración de pseudovitritina que es significativamente menor que los carbones normales.

BREVE DESCRIPCION DE LOS DIBUJOS

La presente invención se ilustrará basándose en la siguiente descripción de una incorporación preferida de la misma.

DESCRIPCIÓN DE LA INCORPORACIÓN PREFERIDA

De acuerdo con la presente invención, se divulga una formulación explosiva. La presente invención se refiere generalmente a una formulación explosiva multi-componente que encuentra un empleo versátil en operaciones de voladura tales como, pero no limitadas a, operaciones de minería y similares. No obstante, como se entenderá, la formulación puede aplicarse a otras operaciones de voladura. Específicamente, se observará que la presente invención se refiere a la aplicación de formas modificadas de explosivos de Nitrato de Amonio y Petróleo Combustible (ANFO), que se han modificado por la incorporación de un material combustible sólido. En el contexto más amplio, la composición explosiva de la presente invención consta de componentes configurados y correlacionados unos con otros, con el fin de alcanzar el objetivo deseado.

La presente invención provee una formulación explosiva que consta por lo menos de tres componentes: un componente sólido granular seco que es un oxidante, un petróleo combustible líquido con alto punto de ebullición o diesel, o similares, y un material combustible sólido.

Individualmente, cada componente de la composición de la invención no es un explosivo. En tal condición, cada componente puede manipularse, embarcarse y almacenarse como oxidantes o como materiales inflamables. Tales clasificaciones se embarcan más fácilmente y en forma menos costosa que los explosivos. Sin embargo, como se entenderá, estos componentes, cuando se mezclan, forman una formulación explosiva que encuentra un uso versátil en operaciones de voladura tales como, pero no limitadas a, operaciones de minería y similares.

El primer componente de la composición de esta invención es un componente seco, que es un compuesto oxidante. El oxidante preferido es nitrato de amonio que se fabrica y despacha como un esferoide o gránulo

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recubierto con un diámetro típico de aproximadamente .09 pulgadas. El primer componente puede seleccionarse fácilmente entre oxidantes empleados convencionalmente en la fabricación de composiciones explosivas para obtener las propiedades deseadas.

El segundo componente de la composición es un componente líquido con alto punto de ebullición. En la incorporación preferida, el segundo componente es un combustible líquido.

El ANFO convencional contiene generalmente una mezcla de nitrato de amonio y 6% en peso de petróleo combustible. La formulación actual comprende una mezcla del primer componente seco y menos de 4% en peso del segundo componente líquido. Como se discutirá, las moléculas de carbono contenidas en el petróleo combustible, que son químicamente necesarias para una voladura óptima, se reemplazan en la formulación actual con el tercer componente de la composición, un material combustible sólido. Tal como se emplea en esta solicitud, todos los pesos y porcentajes en peso se basan en el peso total de la formulación.

El segundo componente puede seleccionarse fácilmente entre componentes líquidos con alto punto de ebullición, usados convencionalmente en la fabricación de composiciones explosivas, para obtener las propiedades deseadas.

El tercer componente de la composición es un material combustible sólido. El componente maceral principal del tercer componente (aproximadamente 75%) es vitrinita, y también se incluyen los macerales liptinita esporinita, cutinita y resinita. Los macerales inertes fusinita y semifusinita están igualmente presentes en el tercer componente. Tal como se emplea en esta solicitud, el término maceral significa aquellas unidades orgánicas que componen la masa del carbón. Como tal, el carbón se compone de macerales, cada uno de los cuales tiene un conjunto distinto de propiedades

físicas y químicas que controlan el comportamiento del carbón.

El tercer componente se caracteriza además en la siguiente forma: (1) la cantidad de macerales liptinita, particularmente cutinita, es más alta que la normal, y (2) casi no está presente pseudovitrinita (madera carbonizada estructurada) en el tercer componente. Más particular, la cantidad normal de macerales liptinita en el carbón es entre 5 -15% en peso del carbón. En contraste, la cantidad de macerales liptinita en el tercer componente es aproximadamente 20%. El grupo vitrinita incluye generalmente dos subgrupos, a saber, la vitrinita de matriz, también conocida como desmovitrinita, y pseudovitrinita, también conocida como telovitrinita. La cantidad normal de macerales vitrinita en el carbón es similar a la cantidad de macerales vitrinita en el tercer componente, aproximadamente 15% en peso. No obstante, del 15% total en peso de macerales vitrinita hallados en el carbón, la cantidad normal del subgrupo pseudovitrinita presente es entre 25-35%. En contraste, del 75% total en peso de macerales vitrinita en el tercer componente, hay presente poca cantidad de trazas, cercanas a 0, de pseudovitrinita aquí.

Especímenes aceptables del tercer componente se encuentran en la Veta de Carbón Friendsville en la base de la Formación Geológica Mattoon y en el Grupo McLainsboro de la Serie Missouri del Sistema Geológico de Pennsylvania de roca sedimentaria del Sureste de Illinois. No obstante, pueden utilizarse materiales combustibles sólidos con las características descritas anteriormente.

Las propiedades químicas y físicas inherentes del tercer componente, como se describen y usan con los componentes primero y segundo, permite velocidades de voladura, correspondientes o que corresponden muy de cerca a las frecuencias resonantes naturales de aquellos materiales que se están dinamitando, utilizando así únicamente la energía requerida para fragmentar y mover la roca, y hacerlo de una manera más segura y

eficiente.

Estos componentes de la presente formulación pueden empacarse en recipientes separados, empleados convencionalmente para el propósito deseado. El mezclado de los componentes puede llevarse a cabo usando medios de mezclado conocidos en el arte, y no requiere agitación mecánica. Como tal, no se requiere un mezclador accionado por un motor. Por lo tanto, el mezclado de estos componentes líquidos y secos para producir la formulación explosiva puede realizarse justo antes de necesitar la composición explosiva.

Como se discute, la presente invención contiene una mezcla del primer componente (el componente seco) y menos del 4% en peso del segundo componente líquido. El aproximadamente 4% en peso en la presente formulación representa una disminución significativa en el volumen del componente líquido utilizado, cuando se compara con el uso del 6% convencional en peso de los explosivos del arte previo. Las moléculas de carbono en el segundo componente, químicamente necesarias para una explosión óptima, se reemplazan en la formulación actual con el tercer componente. La aplicación de un menor volumen del segundo componente líquido, como se describe, reduce el costo de la presente formulación explosiva, comparada con las composiciones explosivas disponibles en la actualidad. Análogamente, la inclusión del tercer componente, como se discute, reduce el volumen requerido del primer componente, lo cual disminuye aún más el costo de la presente formulación explosiva comparado con las composiciones explosivas disponibles en la actualidad.

La relación de mezclado del tercer componente con respecto al ANFO es un cálculo basado en la frecuencia resonante natural estimada de la roca, pizarra u otro material a dinamitar. El tercer componente puede mezclarse en rangos de alrededor de 5% a 50% del peso total de la formulación. La formulación se carga y se retarda, y el disparo se inicia como se conoce en

el arte el método ANFO convencional.

Ahora se darán ejemplos de la invención.

Hubo tres componentes en los agentes explosivos usados en el ensayo, nitrato de amonio mezclado con 4% de petróleo combustible en peso (ANFO-4), el material tercer componente en bruto y el material tercer componente lavado con aire. Como se describe, se utilizó ANFO con sólo 4% de aceite porque el material tercer componente provee combustible adicional a la mezcla de agente explosivo. Las muestras de material tercer componente fueron 3/8 menos de pulgada en tamaño. Las mezclas para cada ensayo se elaboraron usando un camión de explosivos, equipado con dos tolvas separadas de producto y barrenas helicoidales. La velocidad de la barrena helicoidal bajo cada tolva podía variarse para obtener la mezcla apropiada. Durante los ensayos, el ANFO-4 se puso en una tolva y el material tercer componente se puso en la segunda tolva. Material de cada tolva se transfirió con un tornillo helicoidal ("*was augered*") a una serie de barrenas helicoidales colectoras comunes que mezclaban los agentes explosivos, a medida que se transferían al barreno.

Todos los barrenos perforados para las ensayos tenían 9 7/8 pulgadas de diámetro. En promedio los huecos tenían 99 pies de profundidad con 7 pies de relleno, 17 pies de retacado y una columna de polvo de 75 pies. Los huecos de ensayo del ANFO-4 y el material tercer componente lavado se ubicaron en la primera fila a lo largo del frente de avance del crestón ("*highwall face*") de modo que si ocurría un mechazo hubiera una cantidad mínima de material para volver a disparar y mover con un tiro convencional. Los barrenos de ensayo del material tercer componente en bruto se incorporaron en un tiro de producción y se pusieron en las filas primera y segunda del tiro. Las cargas del frente de avance del crestón variaron de 22 a 24 pies y todos los huecos se distanciaron 24 pies unos de otros. Cada barreno se inició con un detonador no eléctrico y un fulminante

fundido ("*cast primer*") de 16 onzas. El retardo de superficie entre los barrenos varió de 25 a 50 milisegundos teniendo cada voladura un retardo en el extremo bajo de la cañería de perforación desde la superficie de 500 milisegundos ("*a 500 millisecond down-hole*"). La configuración de todos los barrenos en el ensayo es típica de los diseños utilizados en disparos de producción normales.

Las ensayos se iniciaron con un tiro de 4 barrenos con 100% ANFO-4, seguidos por tres tiros de 4 barrenos con mezclas de 9.1% de material tercer componente lavado y 90.9% ANFO-4, 21.1% de material tercer componente lavado y 79.9% ANFO-4, y 29.8% de material tercer componente lavado y 70.2% ANFO-4. Las mezclas restantes, a saber, 38.2% de material tercer componente lavado y 61.8% ANFO-4, 51% material tercer componente lavado y 49% ANFO-4, 14.9% material tercer componente en bruto y 85.1% ANFO-4, 27.4% material tercer componente en bruto y 82.6% ANFO-4, 41.6% material tercer componente en bruto y 68.4% ANFO-4, 45.3% material tercer componente en bruto y 54.7% ANFO-4, y 55.7% material tercer componente en bruto y 44.3% ANFO-4 se ensayaron con los tiros de 2 barrenos. Los datos recolectados de cada tiro se emplearon para producir un trazado de velocidad. La velocidad de detonación puede calcularse escogiendo dos puntos en el trazado o mediante análisis de regresión de todo el trazado. En este ensayo, se empleó análisis de regresión en lugar de datos punto a punto porque se cree que representa con más exactitud los resultados del ensayo. Los resultados del ANFO-4 y mezclas de material tercer componente lavado y en bruto se representan en la siguiente tabla.

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Ensayo No.	Mezcla Promedio			Velocidades de Detonación – Análisis de Regresión R/W				
	% Material Tercer Componente Lavado	% Material Tercer Componente en Bruto	%ANFO4	Barreno #1	Barreno #2	Barreno #3	Barreno #4	Promedio
1	0,0%		100,0%	12.960	12.086	13.006	12.283	12.584
2	9,1%		90,9%	13.407	12.523	11.959	12.515	12.601
3	21,1%		78,9%	12.962	12.598	11.503	12.471	12.384
4	29,8%		70,2%	12.180	12.061	11.931	11.828	12.000
5	38,2%		61,8%	11.425	10.725			11.075
5	51,0%		49,0%			9.088	9.264	9.176
6		14,9%	85,1%	13.006	13.629			13.318
6		27,4%	72,6%	12.041	12.818			12.430
6		41,6%	58,4%	10.859	11.485			11.172
6		45,3%	54,7%	8.285	10.974			9.630

ANFO-4 – El 100% ANFO-4 disparó bien y tuvo una velocidad promedio de detonación (VOD) de 12,584 fps. Presentó un ligero déficit de combustible y se produjo un humo anaranjado al final del tiro, lo cual es típico de esa condición. La fragmentación y movimiento de roca volada fue similar a las voladuras de producción usando ANFO con 6% de combustible. El ensayo con ANFO-4 se llevó a cabo para establecer una velocidad de referencia para tiros posteriores.

Mezclas de Material Tercer Componente Lavado – Todas las mezclas lavadas ensayadas dispararon bien y tuvieron velocidades de detonación constantes. No se presentaron mechazos. Se presentó cierta cantidad de humo blanco o vapor y el exceso de combustible continuó quemando por un instante luego de detonar la mezcla de 51%. En todos los ensayos, la fragmentación y movimiento de roca volada fueron similares a las voladuras de producción usando ANFO con 6% de petróleo combustible, aunque fue evidente que hubo una ligera disminución en fragmentación y movimiento a medida que el porcentaje del material tercer componente excedió del 40%. A medida que aumentó el porcentaje de material tercer componente en la mezcla, disminuyó la velocidad de detonación. Esta relación es casi lineal. En términos generales, un incremento del 1% en el

material tercer componente disminuyó la VOD en 82 pies por segundo. La velocidad promedio más alta registrada fue de 12.601 fps para la mezcla de 9,1% material tercer componente lavado y 78,9% ANFO-4. La más baja fue 9.176 fps para el ensayo con 51% material tercer componente lavado y 49% ANFO-4.

Mezclas de Material Tercer Componente en Bruto – Todas las mezclas de material tercer componente en bruto ensayadas dispararon bien y tuvieron velocidad de detonación constante. No se presentaron mechazos ni signos de combustión incompleta. La fragmentación y movimiento de roca volada fueron similares a los resultados del material tercer componente lavado. A medida que aumentó el porcentaje de material tercer componente, disminuyó la velocidad de detonación. En promedio, un incremento del 1% en el material tercer componente disminuyó la VOD en 122 pies por segundo. La velocidad promedio más alta registrada fue de 13.318 fps para la mezcla de 14,9% material tercer componente en bruto y 85,1% ANFO-4. La más baja fue 8.361 fps para el ensayo con 55,7% material tercer componente en bruto y 44,3% ANFO-4.

Resultados Combinados – Los resultados de la pruebas VOD del material tercer componente lavado y en bruto fueron comparables. En promedio las VOD's del material tercer componente en bruto fueron ligeramente más altas que las del material tercer componente lavado. Esto puede haber obedecido en parte a la menor distribución de tamaño del material tercer componente en bruto. El 23,3% del material tercer componente en bruto fue un tamaño de abertura de malla 28 menos en comparación con 8,1% para el material tercer componente lavado. Las fracciones de tamaño más pequeño se consumen más fácilmente que las partículas más grandes del material tercer componente, lo cual hace el proceso de detonación más eficiente.

La formulación no sólo disminuye los costos de voladura, sino que la

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aplicación de la formulación produjo una fragmentación comparable, si no mejor, con un lanzamiento efectivo mayor del material volado. Esto resulta en condiciones más seguras de la mina debido a menores ocurrencias de roca en vuelo.

Aunque la descripción anterior contiene muchas especificidades, éstas no deben interpretarse como limitantes del ámbito de la invención sino simplemente como ilustraciones de algunas de las incorporaciones actualmente preferidas de la invención. Por ejemplo, aunque la presente formulación se describió con referencia particular al uso de explosivos ANFO modificados en voladura de roca, hay que anotar sin embargo que la presente invención no se limita a la producción y empleo de este tipo de explosivo, sino más bien el ámbito de la presente invención es más extenso, con el fin de incluir también materiales, modificaciones y usos distintos de los específicamente descritos.

Además, será obvio que las incorporaciones descritas pueden variarse en muchas formas. Tales variaciones no deben considerarse como una desviación del espíritu y ámbito de la invención, y todas esas modificaciones, como serían obvias a un experto en el arte, tienen el propósito de incluirse en el ámbito de la presente invención.

En consecuencia, el ámbito de la invención debe determinarse por las reivindicaciones adjuntas y sus equivalentes legales, más que por los ejemplos dados.

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Reivindicaciones

Reivindico:

1. Una formulación explosiva que contiene:
un componente sólido granular seco,
un componente líquido con alto punto de ebullición, y
un material combustible sólido, en donde dicho material combustible sólido se caracteriza porque contiene un maceral vitrinita, un maceral liptinita, y macerales inertes fusinita y semifusinita, y en donde la cantidad de macerales liptinita es mayor que la normal, y en donde casi no está presente pseudovitrinita en el citado material combustible sólido.
2. La formulación como se expone en la reivindicación 1, en donde el componente sólido granular seco es un oxidante.
3. La formulación como se expone en la reivindicación 2, el oxidante es nitrato de amonio.
4. La formulación como se expone en la reivindicación 1, en donde el componente líquido es un petróleo combustible líquido.
5. La formulación como se expone en la reivindicación 4, en donde la cantidad del componente líquido es de 4% en peso.
6. La formulación como se expone en la reivindicación 1, en donde la cantidad del maceral vitrinita en el citado material combustible sólido es de alrededor del 75% en peso.
7. La formulación como se expone en la reivindicación 1, en donde el citado material combustible sólido está presente en la cantidad de alrededor de 5 a alrededor de 50% en peso.

8. Una formulación explosiva que contiene:
 - un componente oxidante sólido granular seco,
 - un componente líquido con alto punto de ebullición, y
 - un material combustible sólido, en donde dicha formulación explosiva se caracteriza porque el componente líquido no es más del 4% en peso y en donde el citado material combustible es carbón que contiene macerales vitrinita y liptinita.
9. La formulación como se expone en la reivindicación 8, en donde el oxidante es nitrato de amonio.
10. La formulación como se expone en la reivindicación 9, en donde el componente líquido es un petróleo combustible líquido.
11. La formulación como se expone en la reivindicación 10, en donde la cantidad de macerales vitrinita en el citado material combustible sólido es alrededor de 75% en peso del material combustible sólido.
12. La formulación como se expone en la reivindicación 11, en donde el citado material combustible sólido está presente en la cantidad de alrededor de 5 a alrededor de 50% en peso.
13. Una mezcla explosiva que contiene un componente oxidante sólido granular seco, un componente petróleo combustible líquido y un material combustible sólido, en donde dicha mezcla explosiva se caracteriza porque el petróleo combustible líquido no es más de 4% en peso de la mezcla y en donde el citado material combustible sólido es carbón que contiene macererales vitrinita y liptinita.

PATENT COOPERATION TREATY

LCM. 36
4782-3

From the INTERNATIONAL SEARCHING AUTHORITY

To:
LEONARD C. MITCHARD
NIXON & VANDERHYE P.C.
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203-1808

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 4782-3	Date of mailing (day/month/year)
International application No. PCT/US05/39617	FOR FURTHER ACTION See paragraphs 1 and 4 below
Applicant CARBO*PRILL, INC.	International filing date (day/month/year) 02 November 2005 (02.11.2005)

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70.

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Allen B. Felton

Telephone No. 571.272.1300

Form PCT/ISA/220 (January 2004)

(See notes on accompanying sheet)

Article 19 due 2/18/2007
Search & written op due 3/2/2007
Lowman
2/8

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
LEONARD C. MITCHARD
NIXON & VANDERHYE P.C.
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203-1808

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year) **18 DEC 2006**

Applicant's or agent's file reference
4782-3

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.
PCT/US05/39617

International filing date
(day/month/year) 02 November 2005 (02.11.2005)

Applicant
CARBO*PRILL, INC.

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70.

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Allen B. Felton

Telephone No. 571.272.1300

Form PCT/ISA/220 (January 2004)

(See notes on accompanying sheet)

Article 19 Re 2/18/2007

Denial & Written Op Re 9/2/2007

Done
2007

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 4782-3	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US05/39617	International filing date (day/month/year) 02 November 2005 (02.11.2005)	(Earliest) Priority Date (day/month/year)
Applicant CARBO*PRILL, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the Report

a. With regard to the language, the international search was carried out on the basis of:



the international application in the language in which it was filed.



a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (See Box No. III)

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. _____



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/39617

A. CLASSIFICATION OF SUBJECT MATTER

IPC: C06B 47/00(2007.01)

USPC: 149/1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 149/1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST text search: ANFO, coal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,505,800 A (HARRIES et al) 09 April 1996 (09.04.1996), col. 2 and 3	1-13

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

13 November 2006 (13.11.2006)

Date of mailing of the international search report

18 DEC 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Aileen B. Fenton

Telephone No. 571.272.1300

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
LEONARD C. MITCHARD
NIXON & VANDERHYE P.C.
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203-1808

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference 4782-3		Date of mailing (day/month/year) 18 DEC 2006
International application No. PCT/US05/39617		FOR FURTHER ACTION See paragraph 2 below
International filing date (day/month/year) 02 November 2005 (02.11.2005)	Priority date (day/month/year)	
International Patent Classification (IPC) or both national classification and IPC IPC: C06B 47/00(2007.01) USPC: 149/1		
Applicant CARBO*PRILL, INC.		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

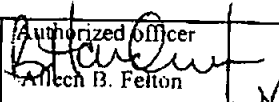
2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion 13 November 2006 (13.11.2006)	Authorized officer  Aileen B. Felton Telephone No. 571.272.1300
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Form PCT/ISA/237 (cover sheet) (April 2005)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US05/39617

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US05/39617

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims NONE YES

Claims 1-13 NO

Inventive step (IS)

Claims NONE YES

Claims 1-13 NO

Industrial applicability (IA)

Claims 1-13 YES

Claims NONE NO

2. Citations and explanations:

Claims 1-13 lack novelty under PCT Article 33(2) as being anticipated by Harries et al (US 5505800).

Harries discloses an ANFO explosive with ammonium nitrate and liquid fuel oil. Some or all of the liquid can be replaced by a carbonaceous fuel, see col. 2 and 3. The macrol content is inherent in this composition.

Claims 1-13 meet the criteria set out in PCT Article 33(4), and thus satisfy industrial applicability because the subject matter claimed can be made or used in industry.

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

*The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired). (12 characters maximum)

4782-3

Box No. I TITLE OF INVENTION
EXPLOSIVE FORMULATION**Box No. II** APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CARBO*PRILL, INC.
528 Main Street, Suite 202
Evansville, Indiana 47708
United States of America

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

Applicant's registration No. with the Office

State (that is, country) of nationality:

US

State (that is, country) of residence:

US

This person is applicant
for the purposes of:☐ all designated
States☒ all designated States except
the United States of America☐ the United States of
America only☐ the States indicated in
the Supplemental Box**Box No. III** FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

WILZBACHER, Dennis R.
14649 Highway 41 North
Evansville, Indiana 47708
United States of America

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is
marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality:

US

State (that is, country) of residence:

US

This person is applicant
for the purposes of:☐ all designated
States☐ all designated States except -
the United States of America☒ the United States of
America only☐ the States indicated in
the Supplemental Box☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.**Box No. IV** AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the ☒ agent ☐ common representative
applicant(s) before the competent International Authorities as:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

MITCHARD, Leonard C.
Nixon & Vanderhye P.C.
901 North Glebe Road, 11th Floor
Arlington, Virginia 22203-1808
United States of America

Telephone No.

703-816-4000

Facsimile No.

703-816-4100

Teleprinter No.

Agent's registration No. with the Office
29,009

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Applicant's registration No. with the Office

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)				
If none of the following sub-boxes is used, this sheet should not be included in the request.				
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) SCHIELE, Michael L. 14649 Highway 41 North Evansville, Indiana 47708 United States of America			This person is: ☐ applicant only ☒ applicant and inventor ☐ inventor only (If this check-box is marked, do not fill in below.) Applicant's registration No. with the Office	
State (that is, country) of nationality: US		State (that is, country) of residence: US		
This person is applicant for the purposes of:	☐ all designated States	☐ all designated States except the United States of America	☒ the United States of America only	☐ the States indicated in the Supplemental Box
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) HARMAN, John C. 14649 Highway 41 North Evansville, Indiana 47708 United States of America			This person is: ☐ applicant only ☒ applicant and inventor ☐ inventor only (If this check-box is marked, do not fill in below.) Applicant's registration No. with the Office	
State (that is, country) of nationality: US		State (that is, country) of residence: US		
This person is applicant for the purposes of:	☐ all designated States	☐ all designated States except the United States of America	☒ the United States of America only	☐ the States indicated in the Supplemental Box
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)			This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only (If this check-box is marked, do not fill in below.) Applicant's registration No. with the Office	
State (that is, country) of nationality:		State (that is, country) of residence:		
This person is applicant for the purposes of:	☐ all designated States	☐ all designated States except the United States of America	☐ the United States of America only	☐ the States indicated in the Supplemental Box
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)			This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only (If this check-box is marked, do not fill in below.) Applicant's registration No. with the Office	
State (that is, country) of nationality:		State (that is, country) of residence:		
This person is applicant for the purposes of:	☐ all designated States	☐ all designated States except the United States of America	☐ the United States of America only	☐ the States indicated in the Supplemental Box
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)			This person is: ☐ applicant only ☐ applicant and inventor ☐ inventor only (If this check-box is marked, do not fill in below.) Applicant's registration No. with the Office	
State (that is, country) of nationality:		State (that is, country) of residence:		
This person is applicant for the purposes of:	☐ all designated States	☐ all designated States except the United States of America	☐ the United States of America only	☐ the States indicated in the Supplemental Box
☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.				

46

Box No. V DESIGNATION OF STATES

The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.

- However,
- ☐ DE Germany is not designated for any kind of national protection
- ☐ KR Republic of Korea is not designated for any kind of national protection
- ☐ RU Russian Federation is not designated for any kind of national protection

(The check-boxes above may be used to exclude (irrevocably) the designations concerned in order to avoid the ceasing of the effect, under the national law, of an earlier national application from which priority is claimed. See the Notes to Box No. V as to the consequences of such national law provisions in these and certain other States).

Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country of Member of WTO	regional application:* regional Office	international application, receiving Office
item (1)				
item (2)				
item (3)				

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as:

- ☒ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ other, see Supplemental Box

* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)).

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used).

ISA / US

Request to use results of earlier search; reference to that search if an earlier search has been carried out by or requested from the International Searching Authority:

Date (day/month/year)

08 August 2005

Number

11/199,618

Country (or regional Office)

US

Box No. VII DECLARATIONS

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

Number of
declarations

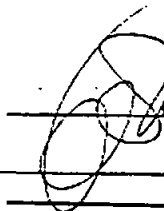
- ☐ Box No. VIII (i) Declaration as to the identity of the inventor
- ☐ Box No. VIII (ii) Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent
- ☐ Box No. VIII (iii) Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application
- ☐ Box No. VIII (iv) Declaration of inventorship (only for the purposes of the designation for the United States of America)
- ☐ Box No. VIII (v) Declaration as to non-prejudicial disclosures or exceptions to lack of novelty

Box No. VIII CHECK LIST: LANGUAGE OF FILING

This international application contains: (a) in paper form, the following number of	This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):	Number of items
sheets: request (including declaration sheets) : 4	1. ☒ fee calculation sheet	
description (excluding sequence listing and/or tables related thereto) : 11	2. ☐ original separate signed power of attorney	
claims : 2	3. ☐ original general power of attorney	
abstract : 1	4. ☐ copy of general power of attorney; reference number, if any:	
drawings : 1	5. ☐ statement explaining lack of signature	
Sub-total number of sheets : 18	6. ☐ priority document(s) identified in Box No. VI as item(s):	
sequence listing	7. ☐ translation of international application into (language)	
tables related thereto	8. ☐ separate indications concerning deposited microorganism or other biological material	
(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c))	9. ☐ sequence listing in computer readable form (indicate type and number of carriers)	
Total number of sheets : 18	(i) ☐ copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application)	
(b) ☐ only in computer readable form (Section 801(a)(i))	(ii) ☐ (only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter	
(i) ☐ sequence listing	(iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column	
(ii) ☐ tables related thereto	10. ☐ tables in computer readable form related to sequence listing (indicate type and number of carriers)	
(c) ☐ also in computer readable form (Section 801(a)(i))	(i) ☐ copy submitted for the purposes of international search under Section 802(b-quarter) only (and not as part of the international application)	
(i) ☐ sequence listing	(ii) ☐ (only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quarter)	
(ii) ☐ tables related thereto	(iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column	
Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the ☐ sequence listing:.....	11. ☐ other (specify)	
☐ tables related thereto:.....		
(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column		

Figure of the drawings which
should accompany the abstract:Language of filing of the
international application: ENGLISH**Box No. IX****SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

Next to each signature, include the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).


Leonhard C. MitchardFor receiving
Office use only1. Date of actual receipt of the purported
international application:3. Corrected date of actual receipt due to later but
timely received papers or drawings completing
the purported international application:4. Date of timely receipt of the required
corrections under PCT Article 11(2):5. International Searching Authority
(if two or more are competent): ISA/6. ☐ Transmittal of search copy
delayed until search fee is paid.

2. Drawings:

☐ received:☐ not received:Date of receipt of the record copy
by the International Bureau:

For International Bureau use only

PCT

FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

International application No

Date stamp of the receiving Office

Applicant or agent's
file reference

4782-3

Applicant

CARBO*PRILL, INC.

CALCULATION OF PRESCRIBED FEES

- | | | | |
|--------------------|-----------------------------------|--------|---|
| 1. TRANSMITTAL FEE | \$300.00 (1601) | 300.00 | T |
| 2. SEARCH FEE | \$1000.00 (1602); \$300.00 (1603) | 300.00 | S |

International search to be carried out by US

(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FILING FEE \$1102.00 (1702)

Where items (b) and/or (c) of Box No. IX apply, enter Sub-total number of sheets

18

Where items (b) and/or (c) of Box No. IX do not apply, enter Total number of sheets

i1	First 30 sheets	1102.00	i1
----	-----------------	---------	----

i2	number of sheets in excess of 30	x	fee per sheet	=	0.00	i2	(1703)
----	----------------------------------	---	---------------	---	------	----	--------

- i3 additional component (only if sequence listing and/or tables related thereto are filed in computer readable form under Section 801(a)(i), or both in that form and on paper, under Section 801(a)(ii):

400	x	fee per sheet	=	0.00	i3
-----	---	---------------	---	------	----

Add amounts entered at i1, i2 and i3 and enter total at I

1102.00 I

4. FEE FOR PRIORITY DOCUMENT (in applicable) (8007)

P

5. TOTAL FEES PAYABLE

1702.00

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

MODE OF PAYMENT

- | | | | |
|--|---|---|---|
| ☐ Authorization to charge deposit account (see below) | ☐ postal money order | ☐ cash | ☐ coupons |
| ☐ Cheque | ☐ bank draft | ☐ revenue stamps | ☒ other (specify) |

Credit Card Payment form

AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT

(This mode of payment may not be available at all receiving offices)

Receiving Office: RO/US

Deposit Account No.: 14-1140

Date: November 2, 2005

Name: Leonard C. Mitchard

Signature:

- ☐
- Authorization to charge the total fees indicated above.

- ☒
- (This check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) authorization to charge any deficiency or credit any overpayment in the total fees indicated above.

- ☐
- Authorization to charge the fee for priority document.

**TRANSMITTAL LETTER TO THE
UNITED STATES RECEIVING
OFFICE**

Date	November 2, 2005
International Application No.	To Be Assigned
Attorney Docket No.	4782-3

I. Certification under 37 C.F.R. § 1.10 (if applicable)

Express Mail mailing number

Date of Deposit

I hereby certify that the application/correspondence attached hereto is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to Mail Stop PCT, commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.

Signature of person mailing correspondence
--

Typed or printed name of person mailing correspondence
--

II. ☒ New International Application

TITLE	EXPLOSIVE FORMULATION
-------	-----------------------

Earliest priority date (Day/Month/Year)
--

SCREENING DISCLOSURE INFORMATION: In order to assist in screening the accompanying international application for purposes of determining whether a license for foreign transmittal should and could be granted and for other purposes, the following information is supplied. (Note: check as many boxes as apply)

- A. ☐ The invention disclosed was **not** made in the United States.
 B. ☐ There is no prior U.S. application relating to this invention.
 C. ☒ The following prior U.S. application(s) contain subject matter which is related to the invention disclosed in the attached international application. (NOTE: priority to these applications may or may not be claimed on form PCT/RO/101 (Request) and this listing does not constitute a claim for priority.)

application no.	60/599,563	filed on	09 August 2004
application no.	11/199,618	filed on	08 August 2005

- D. ☐ The present international application contains additional subject matter not found in the prior U.S. application(s) identified in paragraph C. above. The additional subject matter is found on pages _____ and ☐ DOES NOT ALTER ☐ MIGHT BE CONSIDERED TO ALTER the general nature of the invention in a manner which would require the U.S. application to have been made available for inspection by the appropriate defense agencies under 35 U.S.C. § 181 and 37 C.F.R. § 5.1. See 37 C.F.R. § 5.15.

III. ☐ A Response to an Invitation from the RO/US. The following document(s) is (are) enclosed.

- A. ☐ A Request for An Extension of Time to File a Response
 B. ☐ A Power of Attorney (General or Regular).
 C. ☐ Replacement pages:

pages		of the request (PCT/RO/101)	pages		of the figures
pages		of the description	pages		of the abstract
pages		of the claims			

- D. ☐ Submission of Priority Documents

Priority document		Priority document	
-------------------	--	-------------------	--

- E. ☐ Fees as specified on attached Fee Calculation sheet form PCT/RO/101 annex.

IV. ☐ A Request for rectification under PCT 91 ☐ A Petition ☐ A Sequence Listing Diskette

V. ☐ Other (please specify)

The person signing this form is the:	☐ Applicant	Leonard C. Mitchard.
	☒ Attorney/Agent (Reg. No.) 29,009	Typed name of signer
	☐ Common Representative	Signature

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 08-045001 - 00000-0000

Fecha: 2008-05-02 16:50:30 Dep: 2020 NUCREACION
Tra: 11 PATENTE Y II Evt: 378 FASE NACIONAL
Act: 411 PRESENTACION Folios: 49



Industria y Comercio
SUPERINTENDENCIA

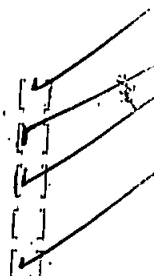
REQUISITOS MINIMOS PARA ADMISION A TRAMITE
PCT

PATENTE DE INVENCION

☒

MODELO DE UTILIDAD ☐

- ◆ Indicación de que se solicita la concesión de una patente
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud
- ◆ Descripción de la invención
- ◆ Dibujos de ser estos pertinentes
- ◆ Comprobante de pago de las tasas establecidas



COMPLETA ☐

INCOMPLETA ☐

DISEÑO INDUSTRIAL ☐

- ◆ Indicación de que se solicita el registro de Diseño Industrial
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud
- ◆ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño
- ◆ Comprobante de pago de las tasas establecidas

COMPLETA ☐

INCOMPLETA ☐

ESQUEMA DE TRAZADO ☐

- ◆ Indicación de que se solicita el registro de un Esquema de Trazado
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud
- ◆ Representación gráfica del esquema trazado
- ◆ Comprobante de pago de las tasas establecidas

COMPLETA ☐

INCOMPLETA ☐

Mauricio Berrío
Firma Responsable

Fecha 2 Mayo / 08

Carrera 13 No. 27-00 Piso 5, 7 y 10
Conmutador: 3 82 08 40
Fax: 350 52 20
E-mail: Info@slc.gov.co
www.slc.gov.co
Bogotá, D.C., Colombia

59

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
CADENA SARMIENTO JUAN PABLO

REFERENCIA	Radicación No.	8 45001
	Solicitud internacional	PCT/US2005/039617
	Fecha inicio fase nacional	02/06/2008
	Trámite	11
	Evento	378
	Actuación	430
	Oficio No.	7792

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.
2. La solicitud no contiene el poder debidamente otorgado, con el lleno de los requisitos exigidos por los artículos 63 y subsiguientes del Código de Procedimiento Civil. Adicionalmente, deberá presentar el documento que acredita la existencia y representación legal de la sociedad solicitante, cuando ésta fuere persona jurídica.
3. El solicitante debe presentar un nuevo título que permita identificar la materia de la cual trata la solicitud, ya que el título relacionado no se encuentra con la precisión necesaria para identificar claramente el objeto de la solicitud de patente. (Regla 4.3 PCT, Art 26-27 D-486, Circular Única 5.2.9)

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

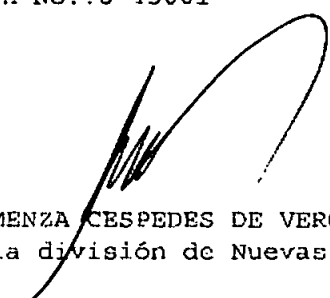
Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Unica No.10 de 2001.

Continúa en la página siguiente...

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REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Radicación No.: 8 45001



ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de
fecha 13 JUN. 2008
jfernand



No. 08-045001- -00002-0000

Fecha: 2008-08-12 16:49:36 Dep: 2020 NUECREACION
Tra: 11 PATENTEYII Eva: 378 FASENACIONAL
Act: 444 RESPUESTAREQUE Folios: 12

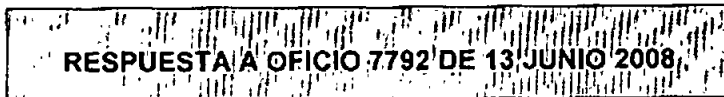
AS: 107.092

Señores

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIVISION DE NUEVAS CREACIONES

E. S. D.



REF: Expediente No. 08 045001- Solicitud de Patente FASE NACIONAL

Corresp. a la Solicitud Internacional PCT/US2005/039617

a favor de **CARBO*PRILL, INC.**

Titulada: FORMULACIÓN EXPLOSIVA MULTICOMPONENTE QUE
INCORPORA VITRINITA COMO MATERIAL COMBUSTIBLE SÓLIDO, Y
MÉTODO DE PREPARARLA

JUAN PABLO CADENA SARMIENTO, vecino de Bogotá, portador de la tarjeta profesional No. 57492 del C.S.J., obrando como apoderado de la sociedad **CARBO*PRILL, INC.**, según lo acredita el documento de poder anexo al presente escrito, para dar cumplimiento al requerimiento notificado por fijación en lista el 13 de junio de 2008, de acuerdo con los Artículos 38 y 39 de la Decisión 486 de la Comisión de la Comunidad Andina, Artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la SIC, me permito allegar:

1. Documento donde consta la cesión del derecho a la Patente otorgado por los inventores al solicitante, debidamente apostillado, junto con su correspondiente traducción al castellano.
2. Fotocopia autenticada del documento de poder conferido por el solicitante, incluyendo el Certificado que acredita la Existencia y Representación Legal de **CARBO*PRILL, INC.**, debidamente apostillado y traducido al castellano.
3. Nuevo título el cual precisa el objeto de la solicitud
"FORMULACIÓN EXPLOSIVA MULTICOMPONENTE QUE INCORPORA VITRINITA COMO MATERIAL COMBUSTIBLE SÓLIDO, Y MÉTODO DE PREPARARLA".
4. Extracto para publicación, Tarjeta de Archivo Temático y nueva Tarjeta de Propietarios con el Nuevo Título.

De la señora jefe atentamente,

JUAN PABLO CADENA SARMIENTO

C.C. No. 80.410.337 de Usaquén

Cra 7 No. 71-21, Torre B, Piso 4

Bogotá, 11 de agosto de 2008

MEV/CAG/aac

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES

TARJETA ARCHIVO TEMÁTICO

PATENTE DE INVENCION X PCT X MODELO DE UTILIDAD DISEÑO INDUSTRIAL

(21) N° de solicitud: 08 045001

(22) Fecha de solicitud: 02-05-2008

(54) Clasificación Internacional:

(71) Solicitante(s) CARBO*PRILL, INC.

(72) Inventor(es) Dennis R. WILZBACHER, Michael L. SCHIELE, John C. HARMAN

(74) Agente: JUAN PABLO CADENA SARMIENTO

(30) Prioridad (31) No. Prioridad (32) Fecha (33) Pais

FIGURA CARACTERISTICA
6 x 6 cm

(85) Fecha inicio fase nacional: 02-06-2008

(87) Publicación internacional:

(86) Datos relativos a la presentación de la solíc. PCT
Fecha de presentación de la solicitud: 02-11-2005
No. de solicitud: PCT/US2005/039617

Fecha: 10-05-2007
No. Publicación: WO 2007/053143 A1

(54) Título: **FORMULACIÓN EXPLOSIVA MULTICOMPONENTE QUE INCORPORA VITRINITA COMO MATERIAL COMBUSTIBLE SÓLIDO, Y MÉTODO DE PREPARARLA**

(57) Reivindicación(es):

- Una formulación explosiva que contiene:
un componente sólido granular seco,
un componente líquido con alto punto de ebullición, y
un material combustible sólido, en donde dicho material combustible sólido se caracteriza porque contiene un maceral vitrinita, un maceral liptinita, y macerales inertes fusinita y semifusinita, y en donde la cantidad de macerales liptinita es mayor que la normal, y en donde casi no está presente pseudovitrinita en el citado material combustible sólido.

CONTINUA AL RESPALDO ...

8
54

13. Una mezcla explosiva que contiene un componente oxidante sólido granular seco, un componente petróleo combustible líquido y un material combustible sólido, en donde dicha mezcla explosiva se caracteriza porque el petróleo combustible líquido no es más de 4% en peso de la mezcla y en donde el citado material combustible sólido es carbón que contiene macererales vitrinita y ipinita.

44
06

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES

PCT/US2005/039617

PATENTE

☒

MODELO DE UTILIDAD

☐

DISEÑO INDUSTRIAL

☐

SOLICITANTE/S. RAZON SOCIAL O APELLIDOS Y NOMBRES

CARBO*PRILL, INC.

DOMICILIO

EVANSVILLE, INDIANA, ESTADOS UNIDOS DE AMERICA

APODERADO

JUAN PABLO CADENA SARMIENTO

TITULO

FORMULACION EXPLOSIVA MULTICOMPONENTE QUE INCORPORA VITRINITA COMO MATERIAL COMBUS-
TIBLE SOLIDO, Y METODO...

CLASIFICACION

EXPEDIENTE No.

08 045001

FECHA DE SOLICITUD

02-05-2008

ROLLO MICROFILM

CERTIFICADO No.

FECHA DE CONCESION

VIGENCIA DESDE

HASTA

PRORROGA

CAMBIO DE NOMBRE

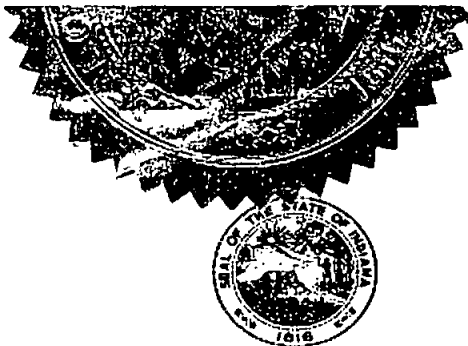
TRASPASO A

INVENTOR (ES)

DENNIS R. WILZBACHER, MICHAEL L. SCHIELE, JOHN C. HARMAN

OTROS

OFICINA DE COMUNICACIONES



SECRETARY OF STATE
STATE OF INDIANA

Todd Rokita
Secretary of State

APOSTILLE

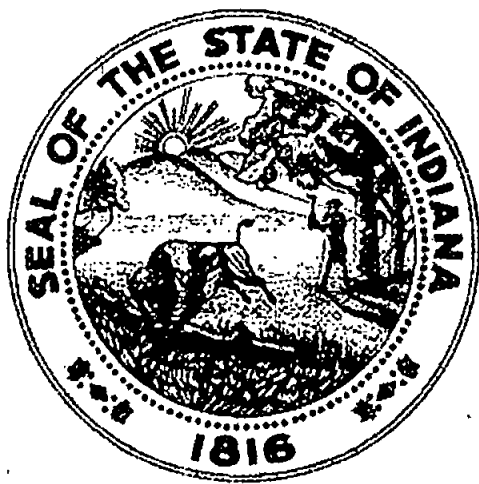
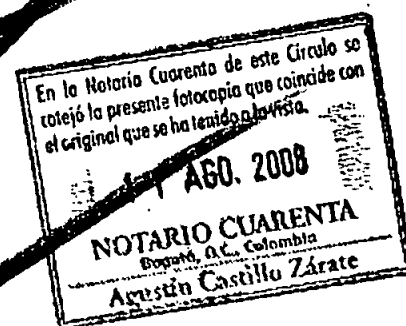
(Convention de la Haye du 5 Octobre 1961)

1. Country: United States of America
2. This public document has been signed by *Debra A. Whitsell*
3. acting in the capacity of notary public in & for *Johnson* County
4. and bears the seal/stamp of notary public in & for the State of Indiana

CERTIFIED

5. at Indianapolis, Indiana
6. this the *Thirty-first* day of *July*, 2008
7. by Secretary of State of Indiana
8. No. A2008 - 14234
9. Seal/Stamp:

10. Signature:



Todd Rokita

Todd Rokita
Indiana Secretary of State

Effective May 1, 2003 all apostilles from the Indiana Secretary of State will have an electronically printed seal.

tdove

58

PATENT APPLICATION

SOLICITUD DE PATENTE

ASSIGNMENT

CESION

The Undersigned, Dennis R. WILZBACHER,
Michael L. SCHIELE, John C. HARMAN

El(los) Suscrito(s), Dennis R. WILZBACHER,
Michael L. SCHIELE, John C. HARMAN

acting as Inventors

en calidad de inventores

of Colombian Patent Application
No.

de la solicitud de patente en Colombia
No.

Titled: EXPLOSIVE FORMULATION

Titulada:

5/5/08. ~~with domicile in, 14649 Highway 41 North,
Evansville, IN 47708, US; 14649 Highway 41
North, Evansville, IN 47708, US; 14649
Highway 41 North, Evansville, IN 47708, US;
domiciled in, 528 Main Street, Suite 202,
Evansville, IN 47708, United States of America~~

~~con domicilio en, 14649 Highway 41 North,
Evansville, IN 47708, US; 14649 Highway 41
North, Evansville, IN 47708, US; 14649
Highway 41 North, Evansville, IN 47708, US.~~

hereby declare(s) that he/they assign(s) all rights
of ownership as well as all rights and privileges
relating thereto without exception over the
following patent application in Colombia:
No.

declara(n) por el presente documento que
cede(n) todos los derechos de propiedad que
le(s) correspondan, así como las
prerrogativas, sin excepción alguna, sobre la
siguiente solicitud de patente en Colombia:
No.

Titled: EXPLOSIVE FORMULATION

Titulada:

to, CARBO*PRILL, INC.

a, CARBO*PRILL, INC.

domiciled in, 528 Main Street, Suite 202,
Evansville, IN 47708, United States of America

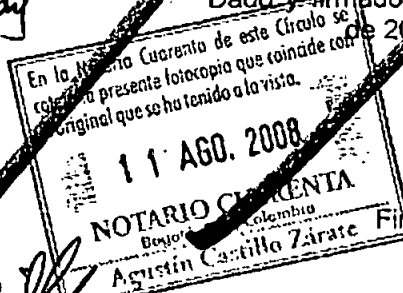
domiciliada en, 528 Main Street, Suite 202,
Evansville, IN 47708, Estados Unidos de
América

The assignor(s) and the assignee sign this
document as proof of their acceptance of the
assignment.

El(los) cedente(s) y el cesionario firman este
documento como prueba de su aceptación de
la cesión.

Given and signed on the *7th* day of *May*
of 200*8*.

Dado y firmado a los _____ días del mes de



Signature of Assignor

Michael L. Schiele
John C. Harman

Signature of Assignee

Dennis R. Wilzbacher
DENNIS R. WILZBACHER
*PRILL. CARBO*PRILL, INC.*

Firma del Cedente

Firma del Cesionario

ESPACIO EN BLANCO

X On this 7th day of May of 2008
personally appeared before me,
Andrew Fenwick
to me known, and known to me to be the person who
signed the foregoing instrument who being by me duly
sworn did depose and say that he (she) is the

Hoy de de
personalmente compareció ante mí,

a quien conozco, y de quien me consta que firmó
el anterior documento, debidamente juramentado
declaró y dijo que él es

X of V.P., R & D Carbo Print Inc de,

Which is legally constituted for a term not yet expired,
that deponent is authorized by said Company to
confer this Assignment document: that the seal
affixed hereunto by the deponent in the name and on
behalf of said Corporation is the corporate seal
thereof, and that the purpose for which this instrument
is granted is included within the corporate purpose of
company.

Sociedad legalmente constituida para un periodo
de duración que aún no ha terminado; que el
declarante está autorizado por dicha compañía
para conferir este documento de Cesión; que el
sello estampado por él al pie de tal Cesión, en
nombre y representación de la expresada
compañía, es el sello oficial de ella; y que el objeto
para el cual se confiere este instrumento está
comprendido dentro del de la sociedad.

X The undersigned Notary Public attests that he has
seen the documents that prove the existence of the
company.
County - Vanderburgh
State of *Indiana*
under date of *May 7, 2008*

El suscrito Notario hace constar que tuvo a la vista
las pruebas de la existencia de la sociedad.

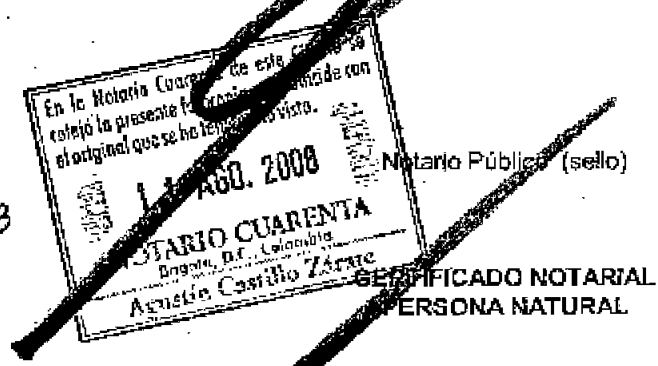
Estado de
con fecha

and that he (she) who grants the present Assignment
document is its Representative.

y que quien confiere el presente documento de
Cesión es su representante.

Debra A. Whitzell

X Notary Public (Seal)
Exp Date - 7-6-2013
NOTARIAL CERTIFICATE
NATURAL PERSON



X On this 7th day of May of 2008
personally appeared before me, Dennis R.
WILZBACHER, Michael L. SCHIELE, John C.
HARMAN

Hoy de de
compareció(eron) ante mí, Dennis R.
WILZBACHER, Michael L. SCHIELE, John C.
HARMAN

who is(are) known to me and who I attest executed
the foregoing document and he (they) declared he
(they) grant(s) the document for the uses and
purposes therein expressed.

a quien (es) conozco y me consta que es(son)
la(s) persona(s) firmante(s) del documento que
precede y quien(es) declara(n) que otorgan el
mismo para los fines y propósitos que en él se
expresan.

X *Debra A. Whitzell*
Notary Public (Seal)

Notario Público (sello)

860

TRADUCCIÓN AL ESPAÑOL del documento de cesión de solicitud de Patente a
CARBO PRILL INC,, firmado por los cedentes y el cesionario.

SECRETARÍA DE ESTADO
ESTADO DE INDIANA

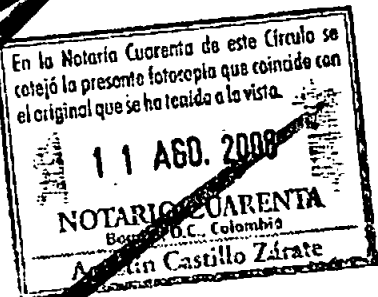
Todd Rokita
Secretario de Estado

APOSTILLA
(Convención de La Haya del 5 de Julio de 1961)

- 1. PAÍS: ESTADOS UNIDOS DE AMÉRICA
ESTE DOCUMENTO PÚBLICO
- 2. HA SIDO FIRMADO POR DEBRA A. WHITSELL
- 3. ACTUANDO EN CAPACIDAD DE NOTARIO PÚBLICO, EN Y PARA EL CONDADO
DE JOHNSON
- 4. Y LLEVA EL SELLO/TIMBRE EN Y PARA EL ESTADO DE INDIANA

CERTIFICADO

- 5. EN INDIANÁPOLIS, INDIANA
- 6. ESTE TREINTA Y UNO DE JULIO DE 2008
- 7. POR EL SECRETARIO DE ESTADO DE INDIANA
- 8. NO. A2008 - 14234
- 9. SELLO/TIMBRE
- 10. FIRMA

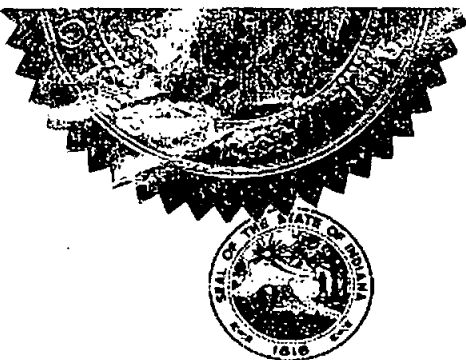


(FIRMA)
TODD ROKITA
SECRETARIO DE ESTADO DE INDIANA

Hay un sello que dice:
SELLO DEL ESTADO DE INDIANA
1818

ESPACIO EN BLANCO

9/61



SECRETARY OF STATE
STATE OF INDIANA

Todd Rokita
Secretary of State

APOSTILLE

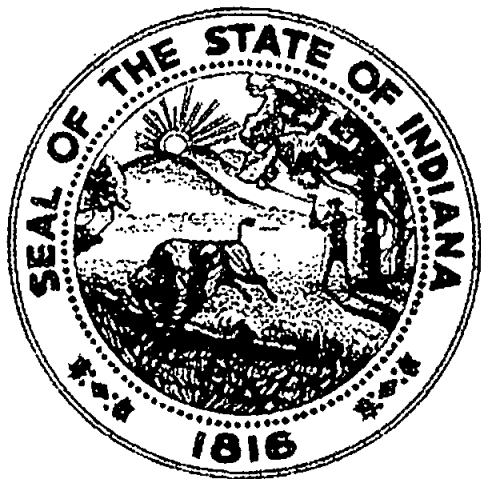
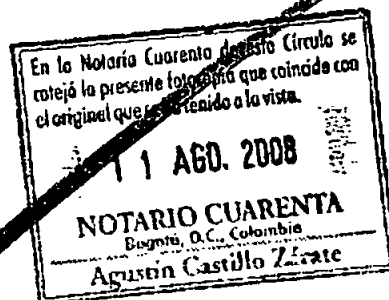
(Convention de la Haye du 5 Octobre 1961)

1. Country: United States of America
2. This public document has been signed by *Debra A. Whitsell*
3. acting in the capacity of notary public in & for *Johnson* County
4. and bears the seal/stamp of notary public in & for the State of Indiana

CERTIFIED

5. at Indianapolis, Indiana
6. this the *Thirty-first* day of *July*, 2008
7. by Secretary of State of Indiana
8. No. A2008 - 14234
9. Seal/Stamp:

10. Signature:



Todd Rokita

Todd Rokita
Indiana Secretary of State.

Effective May 1, 2003 all apostilles from the Indiana Secretary of State will have an electronically printed seal.

ldove

CERTIFICADO NOTARIAL (SOCIEDAD)

NOTARIAL CERTIFICATE (CORPORATION)

Hoy de
personalmente compareció ante mí

a quien conozco, y de quien me consta que firmó el anterior documento, debidamente juramentado declaró y dijo que él (ella) es

de **CARBO*PRILL, INC.**

Sociedad legalmente constituida para un período de duración que aún no ha terminado; que el declarante está autorizado por dicha compañía para conferir este poder; que el sello estampado por él al pie de tal poder, en nombre y representación de la expresada compañía, es el sello oficial de ella; y que el objeto para el cual se confiere este instrumento está comprendido dentro del objeto social de la sociedad.

El suscrito Notario hace constar que tuvo a la vista las pruebas de la existencia de la sociedad.

Estado de
con fecha

y que quien confiere el presente poder es su representante.

Notario Público (sello)

**CERTIFICADO NOTARIAL
PERSONA NATURAL**

Hoy de de , compareció(eron) ante mí

a quien (es) conozco y me consta que es(son) la(s) persona(s) firmante(s) del documento que precede y quien(es) declara(n) que otorgan el mismo para los fines y propósitos que en él se expresan.

Notario Público (sello)

LEGALIZACIÓN POR APOSTILLA ES REQUERIDA.

de X On this 7th day of May of 2008 personally appeared before me

Andrew Ferrwick

to me known, and known to me to be the person who signed the foregoing instrument who being by me duly sworn did depose and say that he (she) is the

V.P., R&D

of **CARBO*PRILL, INC.**

Which is legally constituted for a term not yet expired, that deponent is authorized by said Company to confer this Power of Attorney: that the seal affixed hereunto by the deponent in the name and on behalf of said Corporation is the corporate seal thereof; and that the purpose for which this instrument is granted is included within the corporate purpose of company.

The undersigned Notary Public attests that he has seen the documents that prove the existence of the company.

County - Vanderburgh
State of Indiana
under date of May 7, 2008

and that he (she) who grants the present power of attorney is its representative.

Debra A. Whitsett

Public Notary (Seal)

Exp Date - 7-6-2013

**NOTARIAL CERTIFICATE
NATURAL PERSON**

On this day of personally appeared before me of

who is(are) known to me and who I attest executed the foregoing document and he (they) declared he (they) grant(s) the document for the uses and purposes therein expressed.

Notary Public (Seal)

LEGALIZATION BY APOSTILLE IS REQUIRED.

Brigard & Castro
BOGOTA - COLOMBIA

PODER

Yo (nosotros) CARBO*PRILL, INC.

domiciliado(s) en, 528 Main Street, Suite 202, Evansville, IN 47708, Estados Unidos de América

Nombro(amos) a: JUAN PABLO CADENA SARMIENTO y/o CARLOS H. PALACIO EASTMAN y/o MARTIN E. TORRES CARDOZO, de Bogotá, Colombia, apoderados verdaderos y legales con poder especial, amplio y suficiente, para recabar de las oficinas y autoridades colombianas administrativas, judiciales y de policía, en cualquier instancia o recurso, la obtención de patentes de invención, registros de marcas, diseños industriales, modelos de utilidad, depósitos de nombres comerciales, lemas comerciales y enseññas, registros de derechos de autor y contratos sobre los mismos, obtención de certificados de obtentor de variedades vegetales, así como sus prórrogas, renovaciones, anotaciones de traspaso, cambios de nombre y/o domicilio y/o dirección; elaborar, tramitar y registrar contratos de licencia y licencias de cualesquiera clases; intervenir como demandante o como demandado en cualquier instancia y recurso ante cualquier juez, corporación, funcionario público o autoridad en acciones judiciales, administrativas y de policía tales como: oposiciones al registro de marcas; acciones de caducidad, cancelación y nulidad; acciones reivindicatorias, acciones derivadas de la obtención o explotación de licencias; acciones de competencia desleal; demandas penales; acciones de indemnización de perjuicios, reclamos y observaciones a solicitudes de patentes, diseños industriales, modelos de utilidad, en el ejercicio de medidas cautelares y en otras acciones o medidas similares.

A este efecto, lo(s) faculto(amos) para elevar solicitudes, formular descripciones, enmiendas, protestas, declaraciones, oposiciones, cancelaciones, nulidades, apelaciones y reclamos; pagar impuestos, cuotas y gravámenes prescritos por la ley; renunciar o desistir a derechos concedidos o en curso de concesión; recibir toda clase de documentos y valores, dando el descargo respectivo, y, en general, para dar ante dichas autoridades todos los pasos necesarios al efecto indicado y tomar todas las medidas que creyeran conducentes al resguardo de mis (nuestros intereses), con todas las demás facultades legales necesarias.

Este poder comprende la facultad de ratificar o confirmar en mi (nuestro) nombre lo actuado así como la facultad de desistir, transigir, comprometer, y la de sustituirlo en todo o en parte y revocar sustituciones. Asimismo nombro(amos) a: JUAN PABLO CADENA SARMIENTO y/o CARLOS H. PALACIO EASTMAN y/o MARTIN E. TORRES CARDOZO, domiciliado(s) en la Carrera 7 No. 71-21, Torre B, Piso 4, mis (nuestros) apoderados en Colombia, con facultades para recibir notificaciones y designar apoderados judiciales o extrajudiciales.

Otorgado y firmado en

hoy de de 200_

Firma

Nombre
Cargo

POWER OF ATTORNEY

I (We) CARBO*PRILL, INC.

domiciled in, 528 Main Street, Suite 202, Evansville, IN 47708, United States of America

Hereby appoints JUAN PABLO CADENA SARMIENTO and/or CARLOS H. PALACIO EASTMAN and/or MARTIN E. TORRES CARDOZO, of Bogotá, Colombia, my (our) true and lawful attorneys with special, ample and sufficient power to obtain from the Colombian administrative, judicial and police offices and authorities, in any instance, privileges of patents of invention, registration of trademarks, industrial designs and utility models; registration of commercial names, slogans and emblems, registration of copyright and contracts related thereto, certificates of obtainers of vegetables varieties, as well as extensions, renewals and recordal of assignments and changes of name and/or domicile and/or address related to the above; to prepare, prosecute and register licenses of any kind; to act as plaintiff or defendant in any instance or recourse, and before any judge, corporation, public official or authority in judicial, administrative and police actions, such as: oppositions to the registration of trademarks; caducity, cancellation and nullity actions; claim actions derived from the obtaining or exploitation of licenses, action of unfair competition; criminal proceedings, actions for payment of damages; claims or observations on patent applications, models, industrial designs and utility models; in the exercise of preventive measures and in other actions or similar proceedings.

To that effect they hereby empowered to file applications; formulate descriptions, enmiendas, protestas, declarations, oppositions, cancellations, nullity appeals, and claims; to pay taxes, quotas and assessments prescribed by law, renounce or waive the rights granted or in the process of granting; to receive all kinds of documents and valuables, giving the respective release of receipt, and, in general, to take before said authorities the necessary steps to such effect, and any measures that they may deem pertinent to the safeguard of my (our) interest(s) with all the other necessary legal powers.

This power includes the faculty to ratify or confirm desist, settle and compromise on my (our) behalf, and to substitute this power in whole or in part and to revoke substitutions. At the same time I (We) hereby appoint JUAN PABLO CADENA SARMIENTO and/or CARLOS H. PALACIO EASTMAN and/or MARTIN E. TORRES CARDOZO, domiciled in Carrera 7 No. 71-21, Torre B, Piso 4, my (our) attorney(s) in fact, with powers to receive notifications and to designate judicial and extrajudicial attorneys.

Granted and signed in Evansville, IN, USA

this 5th day of May 2008

Signature A. Fenwick.

Name Andrew Fenwick
Title V.P., R&D.

17264

TRADUCCION AL ESPAÑOL del Documento de Poder otorgado por CARBO PRILL, INC., con domicilio en 528 528 Main Street, Suite 202, Evansville, IN 47708, Estados Unidos.

SECRETARÍA DE ESTADO
ESTADO DE INDIANA

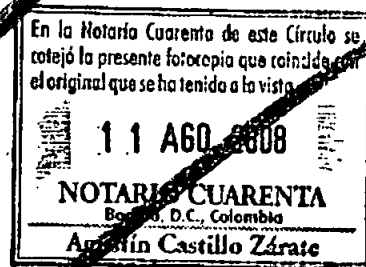
Todd Rokita
Secretario de Estado

APOSTILLA
(Convención de La Haya del 5 de Julio de 1961)

1. PAÍS: ESTADOS UNIDOS DE AMÉRICA
ESTE DOCUMENTO PÚBLICO
2. HA SIDO FIRMADO POR DEBRA A. WHITSELL
3. ACTUANDO EN CAPACIDAD DE NOTARIO PÚBLICO, EN Y PARA EL
CONDADO DE JOHNSON
4. Y LLEVA EL SELLO/TIMBRE EN Y PARA EL ESTADO DE INDIANA

CERTIFICADO

5. EN INDIANÁPOLIS, INDIANA
6. ESTE TREINTA Y UNO DE JULIO DE 2008
7. POR EL SECRETARIO DE ESTADO DE INDIANA
8. NO. A2008 - 14234
9. SELLO/TIMBRE
10. FIRMA



(FIRMA)
TODD ROKITA
SECRETARIO DE ESTADO DE INDIANA

Hay un sello que dice:

SELLO DEL ESTADO DE INDIANA
1816

65

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Folio 65

2020
Bogotá D.C.,

Doctor(a)
CADENA SARMIENTO JUAN PABLO
Apoderado(a) y/o Representante de
CARBO*PRILL, INC

REFERENCIA	Radicación No.	08 45001
	Solicitud internacional	PCT/US2005/039617
	Fecha inicio fase nacional	02/06/2008
	Trámite	11
	Evento	378
	Actuación	416
	Oficio No.	9135
	Folios	1

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en la Decisión 486 de la Comisión de la Comunidad Andina, el Tratado de Cooperación en Materia de Patentes (PCT), el Reglamento y la Circular Única de la Superintendencia de Industria y Comercio, se envía el extracto de la solicitud a la Oficina de Comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial.

Cúmplase
Dado en Bogotá DC,

29 OCT. 2009

ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

adpa10

DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 08-045001

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **611** DE

FECHA **31 DE DICIEMBRE DE 2009** EL TÉRMINO HÁBIL SEÑALADO POR LA

LEY EXPIRA EL **06 DE ABRIL DE 2010**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____

NO X