UNITED STATES PATENT OFFICE.

JOSEPH SAYERS, WALTER ATKINSON WILSON, AND JAMES THORBURN, OF ARDEER, SCOTLAND, ASSIGNORS TO E. I. DU PONT DE NEMOURS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF NEW JERSEY.

EXPLOSIVE.

995,376. Specification of Letters Patent. Patented June 13, 1911.

No Drawing. Original application filed November 15, 1910, Serial No. 592,535. Divided and this application filed April 26, 1911. Serial No. 623,449.

To all whom it may concern:

Be it known that we, JOSEPH SAYERS, WALTER ATKINSON WILSON, and JAMES THORBURN, subjects of the King of Great Britain, residing at Ardeer, Ayrshire, Scotland, have invented a new and useful Improvement in Explosives, of which the following is a full, clear, and exact description.

It is well known that the freezing point of nitro-glycerin can be lowered within certain limits by dissolving therein one or more nitro bodies such, for instance, as di-nitro-toluol, tri-nitro-toluol, etc., and various attempts have already been made to utilize this property in the production of explosives which will not be liable to freeze at low temperatures. As appears from patent literature, it has also been proposed, in preparing various explosive mixtures, to incorporate with these ingredients suitable oxidizing agents and in certain cases also suitable combustibles of which wood-meal is one of those recommended. Starting from this standpoint, we have aimed at incorporating in a blasting explosive a sufficiently large proportion of nitro bodies soluble in nitro-glycerin to secure the desired result without rendering the explosive too insensible to detonation, and have adjusted the proportions of the other ingredients present, particularly of the oxidizing agent, *e. g.*, perchlorate of potash, and of the combustible, *e. g.*, wood-meal, with the result that we have succeeded in producing compositions of high explosive power which remains substantially undiminished at low temperatures. The said compositions consist of nitro-glycerin having dissolved therein a mixture of nitro bodies, viz:—mono-nitro-naphthalene, di-nitro-toluol, tri-nitro-toluol, soluble in large proportions, constituting a solution which remains unfrozen at low temperatures; the solution being gelatinized or not in known manner by addition of nitro-cotton or nitro-starch, and the solution or jelly being mixed with an oxidizing agent such as perchlorate of potassium or of sodium or of ammonium or a mixture of such perchlorates, or in lieu of or as well as the perchlorate or perchlorates, one or more of the corresponding nitrates, or chlorates, and with a combustible which is also absorbent, such for instance, as wood-meal, flour, bran or the like, with or without the addition of graphite, magnesium carbonate, chalk or the like. The proportions of the aforesaid ingredients which we have found to be most suitable are as follows:

(1.)

Nitro-glycerin	23.83
Nitro-cotton	1.60
Mono-nitro-naphthalene	1.09
Di-nitro-toluol	3.27
Tri-nitro-toluol	5.83
Potassium perchlorate	52.35
Wood-meal (dry)	12.00
	99.97

(2.)

Nitro-glycerin	18.89
Nitro-cotton	1.27
Mono-nitro-naphthalene	0.87
Di-nitro-toluol	2.60
Tri-nitro-toluol	4.62
Potassium perchlorate	58.75
Wood-meal	9.51
Magnesium carbonate	0.50
Graphite	2.99
	100.00

(3.)

Nitro-glycerin	17.20
Nitro-cotton	1.34
Mono-nitro-naphthalene	1.20
Di-nitro-toluol	3.59
Tri-nitro-toluol	6.37
Potassium chlorate	60.30
Wood-meal	10.00
	100.00

(4.)

Nitro-glycerin	16.00
Nitro-cotton	1.24
Mono-nitro-naphthalene	1.10
Di-nitro-toluol	3.34
Tri-nitro-toluol	5.92
Ammonium nitrate	69.90
Wood-meal	2.50
	100.00

(5.)

Nitro-glycerin	15.80
Mono-nitro-naphthalene	1.10
Di-nitro-toluol	3.80
Tri-nitro-toluol	5.80
Potassium nitrate	41.00
Wood-meal	32.00
Chalk	.50
	100.00

The proportions given in the above examples should not be materially departed from, as the success obtained with our explosives is consequential upon the selection of the proper proportions.

To prevent misunderstanding it may be explained that the proportions of all the ingredients enumerated in the various examples given are applicable only for the particular example, *e. g.*, the proportion of wood-meal in example (4), viz:—2.50,—which approximates to the proportion of wood-meal used in known explosives of a different character—holds good only for that particular example.

We do not herein claim the compounds set forth in the examples, with the exception of the hereinafter claimed compound, as such other compounds form the subject matter of separate applications.

This application is a division of application Serial No. 592,535, filed November 15, 1910.

We do not claim in this application the proportions of the compositions set out herein under the headings "(1)," "(2)," "(3)" and "(4)" as the same are claimed in applications Serial No. 592,535, filed November 15, 1910, and Serial Nos. 623,446, 623,447 and 623,448, filed April 26, 1911.

Having now fully described our invention, what we claim and desire to protect by Letters Patent is:

An explosive compound comprising nitro-glycerin 15.80 per cent., mono-nitro-naphthalene 1.10 per cent., di-nitro-toluol 3.80 per cent., tri-nitro-toluol 5.80 per cent., potassium nitrate 41.00 per cent., wood-meal 32 per cent., and chalk .50 per cent.

In testimony of which invention, we have hereunto set our hands, at Glasgow, Scotland, and Nanaimo, Canada, respectively, on this 15th day of Feby. and 20th day of March, 1911.

JOSEPH SAYERS.
WALTER ATKINSON WILSON.
JAMES THORBURN.

Witnesses:
JOHN MCCLEARY,
THOMAS BISHOP DRAPER,
E. EYRES.