UNITED STATES PATENT OFFICE.

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DINITROGLYCERIN AND PROCESS OF MAKING THE SAME.

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To all whom it may concern:

Be it known that I, ANTON MIKOLAJCZAK, a subject of the King of Prussia, German Emperor, residing at Castrop, Westphalia, Germany, have invented certain new and useful Improvements in Dinitroglycerin and Processes of Making the Same, of which the following is a specification.

According to present practice in the manufacture of dynamite, carbonite, and other nitroglycerin explosives the necessary nitroglycerin is prepared in the form of trinitroglycerin of as pure a character as possible, under "nitroglycerin" the glyceric trinitrate, $C_3H_5(O.NO_2)_3$, being understood. This nitroglycerin, also known as "blasting-oil," according to the ordinary method of preparation may unintentionally be mixed with a small quantity of less-nitrated compound glyceric ethers or of dinitroglycerin.

Dinitroglycerin, $C_3H_5(O.NO_2)_2OH$, first prepared in the pure state by me, formerly could not be isolated. The valuable properties of this compound ether in consequence remained unrealized, and thus the disadvantages, which, in addition to its many good qualities, attach to nitroglycerin have had to be tolerated. These disadvantages consist in the high sensibility of the substance against mechanical shocks and heat, in the readiness with which it freezes, and the like. They lead to difficulties both in its manufacture and in its application and are the cause of many accidents.

For the purpose of removing the disadvantages of nitroglycerin a number of processes have been invented. I may mention here that of mixing nitrobenzol, amyl nitrate, &c. Most of these processes, however, have proved a total failure, while others have not been employed with real success in practice.

In the employment of dinitroglycerin, $C_3H_5(O.NO_2)_2OH$, I have invented a process of manufacturing explosives which offers great advantages over the processes referred to.

1. Dinitroglycerin is a considerably more stable compound than the extremely unstable blasting-oil trinitroglycerin, $C_3H_5(O.NO_2)_3$. It is therefore much less sensible against mechanical shocks and heat than the latter. Pure dinitroglycerin does not explode on ignition at all. By adding a gradually-increasing percentage of dinitroglycerin to trinitroglycerin the dangerous characteristics of the latter can be more and more modified.

2. Dinitroglycerin can be prepared altogether without danger, since any decomposition accidentally occurring in the course of manufacture, even in the case of very large quantities, does not cause explosion, as numerous experiments where decomposition has been purposely brought about have proved.

3. Dinitroglycerin for all practical purposes may be considered as uncongealable. Its addition to trinitroglycerin lowers the freezing-point of the latter to such an extent that a mixture of, for instance, sixty per cent. dinitro and forty per cent. trinitro glycerin was found to remain perfectly fluid during severe frost, while nitroglycerin lixiviated from commercial dynamites, as well as the latter themselves, froze completely under the same experimental conditions.

4. By the selection of suitable quantities of dinitroglycerin and ordinary blasting-oil an oil can be produced superior to ordinary blasting-oil in explosive power, for nitroglycerin contains more oxygen than is necessary for combustion of the carbonic acid and of the hydrogen to water, while dinitroglycerin contains too little. Thus by mixing these two compound ethers a product equalizing these two conditions can be obtained, which may be regarded as an ideal blasting-oil and whereby the greatest possible explosive force is obtained.

5. What has been said in paragraphs 1, 3, and 4 in respect to dinitroglycerin and its mixtures with blasting-oil naturally applies also to all explosives prepared from the same for shooting and blasting purposes. In the case of such explosive powders for shooting or military purposes there is the additional advantage that on account of the lower temperature of the generated gases, which are also much more slowly generated, the barrel of the gun is attacked to a much less degree than in the case of the well-known nitroglycerin powders.

6. Dinitroglycerin is not only readily soluble in every proportion in nitroglycerin, but by its aid any suitable mixture of di and tri nitroglycerin can be prepared directly.

7. Dinitroglycerin is just as good a solvent and gelatinizing medium for various substances (such as nitro-cellulose, xyloidin, &c.) as is trinitroglycerin.

The following examples of explosives may be here given:

a Sixty-one per cent. dinitroglycerin, 1.8