No. 779,760. Patented January 10, 1905.

# UNITED STATES PATENT OFFICE.

CHRISTIAN EMIL BICHEL, OF HAMBURG, GERMANY.

## EXPLOSIVE.

SPECIFICATION forming part of Letters Patent No. 779,760, dated January 10, 1905.

Application filed November 22, 1902. Serial No. 132,424.

*To all whom it may concern:*

Be it known that I, CHRISTIAN EMIL BICHEL, a subject of the German Emperor, residing at Hamburg, in the German Empire, have invented new and useful Improvements in and Relating to the Manufacture of Explosives, of which the following is a specification.

This invention relates to improvements in explosives, and particularly those which are produced from blasting-gelatin, and in the process of making same.

In order to produce gelatinous explosives, only Nobel's method of manufacture has hitherto been available, which process consists in dissolving collodion-cotton in nitroglycerin and employing the gelatin so obtained, either as such or in combination with a dope, for explosive purposes.

The essential feature of this invention consists in the fact that instead of employing collodion-cotton for gelatinizing nitroglycerin a solution of collodial substances—such, for example, as glue, gelatin, or the like—in liquids adapted for that purpose which have a higher boiling-point than water is utilized. For example, a suitable solvent for this purpose is glycerin, which dissolves glue in sufficient quantity. The solution of the glue in glycerin is preferably effected with heat and constant agitation. After cooling the glue-gelatin is able to take up and retain as much as a fivefold quantity of nitroglycerin, also with efficient agitation and heating. In this manner a tenacious gelatin having a silky gloss is produced, which in every respect presents the same external reactions as gelatins manufactured from collodion-cotton and nitroglycerin and which is adapted for use in the same way as the well-known blasting-gelatin and for the manufacture of gelatin-dynamites and other plastic explosives.

An explosive gelatin consisting of one part glue-gelatin (in the proportion of one glue and seven glycerin) and five parts nitroglycerin produces in Trauzl's lead-block a distention of seven hundred and fifteen cubic centimeters on the average as against six hundred and fifty cubic centimeters distention obtained by the usual blasting-gelatin of ninety-three per cent. nitroglycerin and seven per cent. collodion-cotton. Trauzl's block and the method of using it is described in *Handbook on Modern Explosives*, by M. Eissler, London, 1897. (See pages 175 to 177.) If an explosive gelatin is made from ninety-two per cent. nitroglycerin, five per cent. collodion-cotton, and three per cent. glue-gelatin, (one to seven,) a distention of eight hundred cubic centimeters is obtained as compared with six hundred and fifty cubic centimeters with the old blasting-gelatin without the addition of glue-gelatin.

By altering the proportion of glue glycerin and nitroglycerin gelatins of greater or less stiffness may be obtained and also gelatins which, with the addition of dopes (mixing powders) of wood-dust or flour and saltpeter, give plastic explosives of every explosive force and manner of action according to the proportion of glue-gelatin, nitroglycerin, and mixing powder.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An explosive, containing nitroglycerin and a gelatinous substance, substantially as and for the purpose set forth.

2. An explosive, containing nitroglycerin and a gelatinous substance having a higher boiling-point than water, substantially as and for the purpose set forth.

3. An explosive, containing a gelatinous substance dissolved in a polyatomic alcohol, and nitroglycerin, substantially as and for the purpose set forth.

4. An explosive, containing a gelatinous substance dissolved in a polyatomic alcohol, nitroglycerin and collodion-cotton, substantially as and for the purpose set forth.

5. An explosive, containing a gelatinous substance dissolved in glycerin, and nitroglycerin, substantially as and for the purpose set forth.

6. An explosive, containing a glue dissolved in a polyatomic alcohol and nitroglycerin, substantially as set forth.

7. An explosive, containing glue dissolved in glycerin and nitroglycerin, substantially as set forth.

CHRISTIAN EMIL BICHEL.

Witnesses:

MAX KAEMPFF,

E. H. L. MUMMENHOFF.