

# UNITED STATES PATENT OFFICE.

EDUARD SCHULTZE, OF DARMSTADT, GRAND DUCHY OF HESSE, GERMANY.

## GUNPOWDER.

SPECIFICATION forming part of Letters Patent No. 359,289, dated March 15, 1887.

Application filed December 27, 1886. Serial No. 222,631. (No specimens.) Patented in England December 9, 1885, No. 15,129; in Germany February 24, 1886, No. 33,863, and in Belgium March 3, 1886, No. 72,214.

*To all whom it may concern:*

Be it known that I, EDUARD SCHULTZE, a subject of the King of Prussia, and a resident of Darmstadt, in the Grand Duchy of Hesse, Germany, have invented certain new and useful Improvements in Gunpowder, (for which I have obtained patents in Germany, No. 33,863, February 24, 1886; Great Britain, No. 15,129, December 9, 1885; and Belgium, No. 72,214, March 3, 1886,) of which the following is a full, clear, and exact specification.

The improvements in the manufacture of gunpowder and similar explosives consist in the composition and combination of three kinds of materials—of a nitro-hydrocarburet with pyroxyline, and thirdly with a nitrate or salt, formed by the union of nitric acid with a base and furnishing a compound of oxygen and nitrogen. By mixing these three constituents in various proportions I am able to produce an explosive of greater or less force. When this mixture is to be used as gunpowder for shooting purposes, I take a certain amount of the pyroxyline and diminish the rending force of the pyroxyline by adding nitro-hydrocarburets and nitrates; but when I wish to use said mixture as a blasting explosive, for blasting hard rocks or minerals and other blasting purposes, I augment this amount of pyroxyline, with a view to producing greater rending force. When burning, these mixtures are free, or nearly, from noxious fumes, residue, and recoil. I instance as belonging to the hydrocarburets which I employ in my mixtures common resin or colophony, tar, turpentine, or turpentine-oil, after having treated them with nitric acid. I instance as belonging to the pyroxylines which I employ nitro-cellulose, (cotton or wood or any vegetable fiber.) I include the different varieties of pyroxyline, and instance the form commonly called gun-cotton. I instance as nitrates those of baryta, potassium or sodium, lime, and ammonium. By different combinations of these constituents I am able to produce every class of explosives suitable for all purposes. I can use them, for instance, in the place of dynamite, for blasting hard rocks or minerals, treating the convenient mixture under hydraulic pressure, or in the place of black gunpowder for blasting rocks or minerals less hard, or in the bombs and

shells of the artillery. I can also employ my explosive as a filling for cartridges to be used in coal-mines subject to fire-damp. These cartridges will not ignite the fire-damp, and thus obviate a fruitful cause of accidents. I can also choose another percentage in mixing the three constituents, so that the explosive is then suitable as gunpowder for sporting and military purposes.

I will now give examples of the proportions to be used in preparing explosives according to my invention, but I wish to be understood that they are given as the best proportions with which I am acquainted for carrying my invention into effect, and that I do not limit myself to the precise details given in these examples, as I can advantageously vary the proportions in the same manner as the black gunpowder-makers can and do vary their proportions of charcoal, sulphur, and saltpeter to produce explosives suited to various requirements.

The proportions hereinafter given are by weight. A powder suitable for sporting purposes can be made according to my invention by mixing twelve parts of nitro-tar, or colophony, or turpentine, or turpentine-oil, or mixtures of them, with sixty to eighty parts of pyroxyline, sixty to eighty parts of nitrate of baryta, and eight to ten parts of nitrate of potassium.

This mixture is prepared and granulated in the well-known manner prevalent in making black gunpowder. I may add some binding material or not, and the grains of the finished powder may be coated or not with substances fit for this purpose, such as paraffine, resin, or collodion.

Not more than five-eighths of this gunpowder for sporting purposes thus produced should be used in the place of the quantity of black gunpowder that is generally used for this purpose. The propelling force of the sporting-powder thus produced is excellent and the rending force is not greater than that of black gunpowder, and it is free or nearly free from objectionable fumes, residue, and recoil.

A good gunpowder for rifles is produced by mixing ten parts of nitro-tar, colophony, turpentine, or turpentine-oil, or mixtures of them, with two hundred and eighty to three hundred



parts of pyroxyline, one hundred to one hundred and twenty parts of nitrate of baryta, forty to fifty parts of nitrate of potassium, and about ten parts of sulphur.

5 This mixture is to be granulated in the same manner as the sporting-gunpowder, and should be employed in quantities of about two-fifths the weight of the quantity of black gunpowder used for analogous purposes—such, for instance, as that for military rifles. The finished powder may be coated or not, as mentioned with respect to the sporting-powder.

10 My blasting explosive, suitable for use in blasting mild rocks or minerals, has a little proportion of pyroxyline. I may also add to this explosive a quantity of sulphur.

15 The proportion of the materials may with advantage be about ten parts each of pyroxyline and sulphur, fifteen parts of nitro-hydrocarburets, and seventy-five parts of saltpeter. The greater the proportion of pyroxyline the greater will be the power of the explosive pro-

duced, so that when an explosive is required for blasting hard rocks or minerals the proportion of pyroxyline should and can be increased to suit the purpose for which it is required. 25

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

30 The composition, consisting of a nitro-hydrocarburet, (such as nitro-colophony, tar, turpentine, or turpentine-oil,) and of pyroxyline, and of nitrates or salts furnishing oxygen, in combination with nitrogen, for shooting and blasting purposes, substantially as described. 35

In witness whereof I have hereunto set my hand in presence of two witnesses.

EDUARD SCHULTZE.

Witnesses:

O. MÜLNER,  
B. ROl.