

(No Model.)

A. FAVIER.

EXPLOSIVE AND METHOD OF MAKING THE SAME.

No. 393,634.

Patented Nov. 27, 1888.

Fig. 1

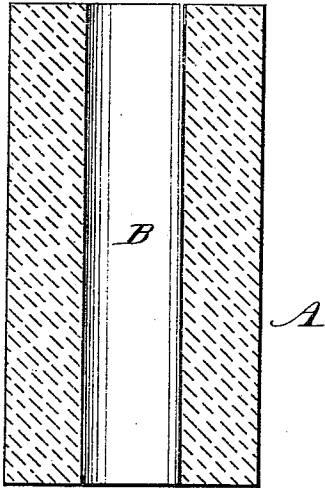


Fig. 4

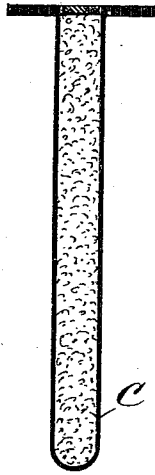


Fig. 2

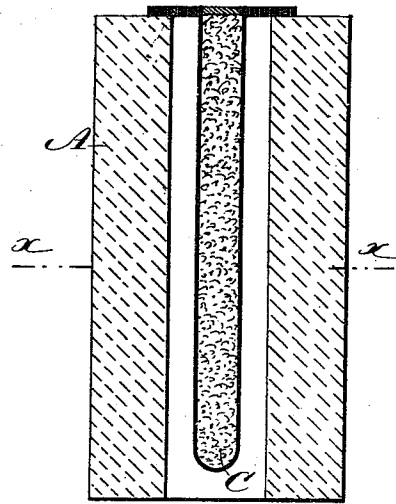


Fig. 5

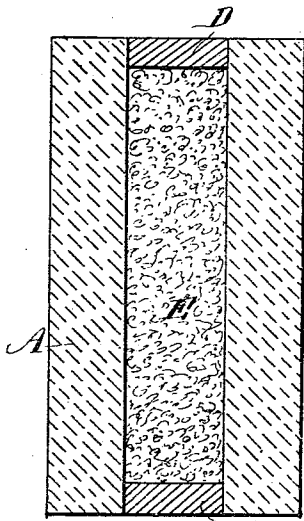


Fig. 3

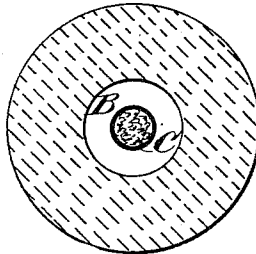


Fig. 7

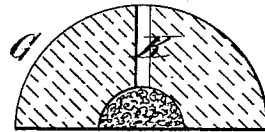
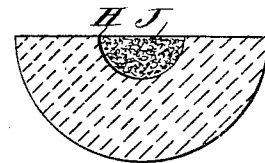
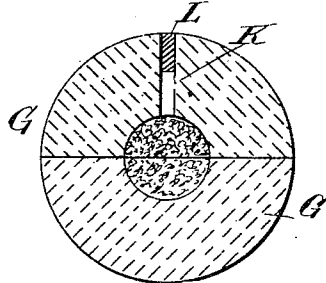


Fig. 6



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ARTHUR FAVIER, OF PARIS, FRANCE.

EXPLOSIVE AND METHOD OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 393,634, dated November 27

Application filed September 1, 1885. Serial No. 176,178. (No model.) Patented in France July 21, 1883, No. 156,659, dated July 21, 1883; in Germany, No. 31,411, dated May 27, 1884, and in England, No. 2,139, dated February 16, 1885, No. 2,139.

To all whom it may concern:

Be it known that I, ARTHUR FAVIER, of Paris, France, have invented a new and Improved Explosive Compound, (for which I have obtained Letters Patent in France, No. 156,659, dated July 21, 1883; in Germany, No. 31,411, dated May 27, 1884, and in England, No. 2,139, dated February 16, 1885,) of which the following is a full, clear, and exact description.

I have sought to replace the nitrated organic explosives by compositions which are more stable, more easily prepared, less expensive, and which are not affected by frost, and I have succeeded by the use of means which will be described hereinafter. To obtain explosive mixtures as powerful as dynamite containing seventy-five per cent. of nitro-glycerine, I use nitrate of ammonia to which a hydrocarbon has been added to combine with the excess of oxygen which the nitrate contains, in the form of carbonic acid or steam; but to obtain this result it is necessary to increase the density of this nitrate and to overcome its hygroscopic properties. For this reason I choose the combustible body to be mixed with the nitrate from fats, natural or slightly nitrated hydrocarburet, resins, &c., which are fusible at a low temperature. The hydrocarbon chosen—paraffine, for example—is mixed with the nitrate, which has previously been pulverized and desiccated. The mixture is then placed in a mold, where it can be given any desired form by subjecting it to pressure. To facilitate the mixing of the parts and to obtain a suitable density, it is preferable to subject it to heat at the same time that it is being pressed. For this purpose the molds in which the compression takes place are heated by pipes containing hot water or steam to the temperature at which the hydrocarburet fuses; or the substances may be heated to this temperature in the vessel in which they are mixed. Under the united influence of the heat and pressure the substances mix, the hydrocarburet covering particles of the nitrate with a protective envelope, then exudes slightly and forms a protective varnish on the exterior, the thickness of which can be increased by plunging the mixture, when taken from the molds, into a melted hydrocarbon. The pressure employed

varies with the density desired. For example, to obtain a density of 1.7 for cartridges of nitrate of ammonia a pressure of three hundred atmospheres may be required. There can be employed for the purpose either a hydraulic pressure of required power or apparatus used in the manufacture of gun-cotton or of compressed gunpowder.

For the manufacture of less powerful explosives I use nitrate of soda, either alone or mixed with nitrate of ammonia and with any composition which can part with the hydrogen which it contains. Before compressing this mixture sulphur may be added to reduce the temperature at which it is changed to gas.

The mixture of nitrate of ammonia and a hydrocarburet, with or without sulphur, having a density of 1.6, is very stable and does not explode, as nitrated bodies do, under the influence of a fulminating cap. Consequently to cause these bodies to explode I have to use intermediate bodies, which are brought into contact with as much as possible of the mixture to be exploded.

As an explosive for the mixture, I prefer to use a very explosive body—such as gun-cotton—having been previously inclosed in a highly-fusible hydrocarburet.

The quantity of gun-cotton or chlorate, &c., used for causing the explosion of the mixture is about equal to one-tenth of the weight of said mixture. I thus obtain an explosive which is very powerful, is inexpensive, can easily be transported and stored, and is not affected by the frost, as are the explosives having nitro-glycerine as a base.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of a cartridge made of my improved explosive mixture, said cartridge having a longitudinal bore. Fig. 2 is a similar view showing an explosive cap in the cartridge. Fig. 3 is a cross-sectional view on the line *x x*, Fig. 2. Fig. 4 is a longitudinal sectional view of the cap. Fig. 5 is a longitudinal sectional view of the cartridge having its bore filled with an explosive substance, the ends of the bore being

closed by disks. Fig. 6 is a cross-sectional view of a spherical cartridge formed of two sections. Fig. 7 is a similar view showing the two sections detached.

5 A is a cartridge composed of a mixture of nitrate of ammonia and a hydrocarburet—such as paraffine—which cartridge has a longitudinal bore, B.

10 C is an explosive cartridge or shell containing any suitable fulminate, which can be placed in the bore of the cartridge A. When the fulminate is ignited, it explodes and ignites the explosive cartridge A. As shown in Fig. 5, the bore of the cartridge is filled with dynamite or any other highly-explosive mass, the ends of the bore being closed by suitable stoppers of paraffine or like substance, D. The dynamite is exploded and in turn ignites the explosive cartridge.

20 As shown in Figs. 6 and 7, the cartridges can be made of two hemispheres, G, composed of my improved explosive mixture, and each provided in its center with an aperture, H, containing an explosive mixture, J, such as dynamite, gun-cotton, &c. Said cartridges are also provided with a channel, K, for containing the fulminate or cap, which channel can be closed by a plug, L, of paraffine or like material.

One of the special advantages of my improved cartridge is that the mixture forming the same is not exploded very easily, and is very safe when being transported or stored, as the fulminate used for firing the cartridge can be left out and not placed in position in central aperture until the cartridge is to be used.

35 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. As a new article of manufacture, an explosive consisting of a highly-compressed intermixture of a nitrate and a hydrocarbon, as hereinbefore set forth.

2. The method of producing the hereinbefore-described explosive, consisting in intimately mixing together a pulverized nitrate, such as specified, and a water-proof hydrocarbon fusible at a low temperature, and then agglomerating said mixture under high pressure, substantially as and for the purpose hereinbefore set forth.

50 The foregoing specification of my improvement in new explosive compounds signed by me.

ARTHUR FAVIER.

Witnesses:

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