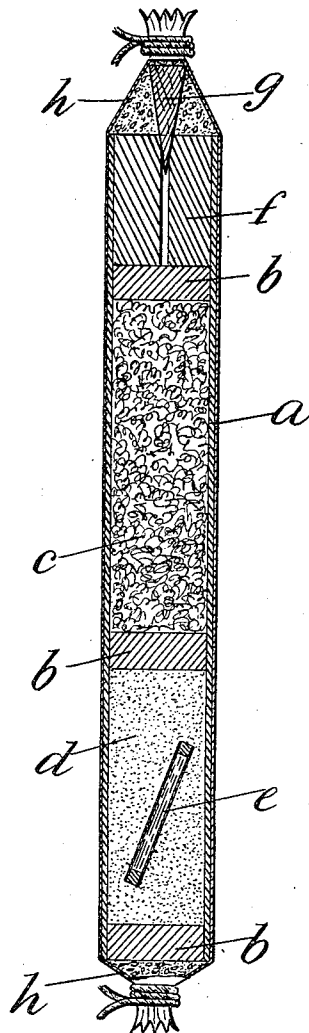


E. MACAULAY.
 APPARATUS FOR REDUCING OR NEUTRALIZING THE NOXIOUS FUMES RESULTING FROM
 THE COMBUSTION OF NITROGLYCERIN EXPLOSIVES.

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1,019,502.

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WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD MACAULAY, OF PAIGNTON, ENGLAND.

APPARATUS FOR REDUCING OR NEUTRALIZING THE NOXIOUS FUMES RESULTING FROM THE COMBUSTION OF NITROGLYCERIN EXPLOSIVES.

1,019,502.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed March 9, 1911. Serial No. 613,263.

To all whom it may concern:

Be it known that I, EDWARD MACAULAY, a subject of the King of Great Britain, whose post-office address is Box No. 187, Bulawayo, Rhodesia, but at present residing at "The Shanty," Paignton, in the county of Devon, England, engineer, have invented a certain new and useful improved apparatus for reducing or neutralizing the noxious fumes resulting from the combustion of nitroglycerin explosives, of which the following is a specification.

This invention has for its object an apparatus or device for annulling as far as possible the noxious fumes resulting from the combustion of explosives having nitroglycerin as their base or as one of their constituents and with this object there is used in tamping drill holes charged with such explosives, such a combination of substances that at the temperature resulting from an explosion, these substances or the products of their combination with each other, will combine with the said noxious fumes to form innocuous compounds. In order to introduce the necessary substances directly into the drill hole and for purposes of transport a cartridge or casing is used which is adapted to contain the required materials in due proportions and separate from each other. When the device is introduced into the hole and the charge fired the force of the explosion and the high temperature resulting therefrom serves to effect the necessary admixture and chemical combination of the substances with each other and with the gaseous products of the explosive.

The apparatus, which has been found in practice to give excellent results, consists of a cardboard or asbestos cylinder divided into two near the center by means of a wad or other suitable transverse partition having one compartment filled with an alkali salt, for example, salammuniac, and the other compartment with the oxid of an alkaline earth, as for example, calcium oxid and a small quantity of permanganate of potash which may be mixed with the calcium oxid or may be inclosed in a small glass tube or other suitable envelop. The ends of the cartridge are closed as by means of wads leaving at one end a space outside the wad for the reception of a longitudinally split cork and a wooden wedge, or any

other suitable expanding plug such as a conical wedge, whereby the end of the cylinder may be expanded into the drill hole. The whole of the cardboard cylinder and the ends are rendered damp-proof as by being greased, and as a further protection against moisture the cylinder is preferably inclosed in a waterproof sleeve, the lower end of which is tied with a string, while the top end in which the wedge is inserted is filled with earth and then tied up.

The accompanying drawing is a vertical section showing a cartridge of this character, *a* being the wall of the cartridge, *b, b, b*, the wads dividing it into compartments for the reception of a charge of salammuniac indicated by *c* and of calcium oxid indicated at *d* together with a tube of permanganate of potash *e*. The longitudinally divided cork filling the free space at the upper end of the cartridge *a* is indicated at *f* and the expanding wedge at *g*. The waterproof sleeve is indicated at *h*, the ends of this sleeve being tied over the ends of the cartridge as shown, the free space around the wedge *g* at the upper end being filled with earth which, upon the wedge *g* being rammed in to expand the cartridge, fills the space around the two sides of the cork, so that the end of the drill hole is completely filled up.

The chief noxious gases produced in the explosion of nitroglycerin or compounds thereof are nitrous acid gas, carbon monoxid and carbon dioxid. The ammonia resulting from the chemical actions consequent on the high temperature of the explosion and the admixture of the ammonium salt of the calcium oxid, combines with the nitrous acid gas to form nitrite or nitrate of ammonia; the carbon dioxid combines with the calcium oxid to form carbonate of calcium and the oxygen evolved from permanganate of potash upon heating converts the carbon monoxid into carbon dioxid which in turn is converted into calcium carbonate, as already mentioned. Further, it is found that so-called chlorid of lime is produced which has an advantageous effect as a disinfectant in the working faces of mines where blasting operations are carried out.

I claim:—

1. A device for neutralizing the noxious gases consequent on the combustion of nitroglycerin explosives in drill holes, com-

prising in combination a container adapted for insertion in the drill hole, said container being divided into compartments, an alkali salt in one compartment, a base and a quantity of permanganate of potash in the other compartment, and means adapted to expand the container in the hole.

2. A device for neutralizing the noxious gases consequent on the combustion of nitroglycerin explosives in drill holes, comprising in combination a container adapted for insertion in the drill hole, said container being divided into compartments, an alkali salt in one compartment, a base and a quantity of permanganate of potash in the other compartment, means adapted to expand the container in the hole, and a closable waterproof sleeve adapted to envelop said container.

3. A device for neutralizing the noxious gases consequent on the combustion of nitroglycerin explosives in drill holes, comprising in combination a container adapted for insertion in the drill hole, said container

being divided into compartments, salammuniac in one compartment, calcium oxid and a quantity of permanganate of potash in the other compartment, and means adapted to expand the container within the hole.

4. A device for neutralizing the noxious gases consequent on the combustion of nitroglycerin explosives in drill holes, comprising in combination a container adapted for insertion in the drill hole, said container being divided into compartments, salammuniac in one compartment, calcium oxid and a quantity of permanganate of potash in the other compartment, means adapted to expand the container within the hole, and a closable waterproof sleeve adapted to envelop said container.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD MACAULAY.

Witnesses:

JOSEPH MILLARD,

WALTER J. SKERTEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."