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PRIMING MIXTURE

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This invention relates to improvements in priming mixtures for small arms ammunition, and more particularly to priming mixtures in which the oxidizing agents are of a non-corrosive type. It is one of the objects of the present invention to provide a priming mixture having an initiator, a sensitizer, a fuel ingredient, and an oxidizing ingredient, none of which will produce a corrosive residue in the gun.

It is a further object of the present invention to avoid the use of mercury fulminate. To attain these and other objects I employ an initiator, consisting of normal lead azide, a sensitizer, as hereinafter defined more at length, a fuel ingredient preferably consisting of antimony sulphide, lead sulphocyanide and calcium silicide, or their equivalents, and an oxidizing ingredient preferably consisting of lead peroxide and barium nitrate, or their equivalents, either with or without minor additions of components heretofore used in priming compounds to control or vary the characteristics thereof.

Heretofore mercury fulminate has been generally used as the initiator in priming mixtures for small arms ammunition. It possesses many advantages and it has been difficult to find other materials to be used in place of mercury fulminate which would produce as satisfactory results, even though considerable effort has been made to eliminate mercury fulminate from priming mixtures. While it possesses certain advantages, it also possesses certain disadvantages. Amalgamation of the cartridge cases caused by the free mercury produced by the decomposition of the mercury fulminate when the cartridge is exploded prevents reloading of center fire cartridges. By employing an initiator in which no mercury fulminate is present, this amalgamation is eliminated, which permits reloading and re-use of center fire cartridge cases. The priming mixture of my invention also possesses advantage for use in rim fire primers. It has greater stability on storing and therefore permits the ammunition to be used and better results obtained after it has been stored for long periods of time.

A suitable priming mixture for center fire cartridges may be formed by mixing the following ingredients in substantially the following proportions, by weight:

Tetrazene	1 to 5% preferably 3%
Normal lead azide	10 to 20% preferably 12%
Barium nitrate	20 to 30% preferably 23%
Lead peroxide	15 to 25% preferably 20%
Antimony sulphide	15 to 25% preferably 20%
Calcium silicide	5 to 15% preferably 10%
Lead sulphocyanide	10 to 20% preferably 12%

Proportions of these ingredients may be varied depending on the strength or purity of the ingredients as obtainable commercially. Also the proportions may be varied to correlate the characteristics of the priming mixture to the size of cartridge, the magnitude of the gun powder charge, the igniting characteristics of the gun powder, and the like. Other ingredients may be added in minor proportions to vary the detonating and other characteristics of the mixture as will be understood by those skilled in the art.

The terms "tetrazene" and "tetrazole derivatives" have been variously defined by earlier workers in the explosives art and there is much confusion in nomenclature. Likewise, structural formulæ for these materials as heretofore published are not easily reconcilable. The material which I employ may be obtained by treating aminoguanidine in the form of its bicarbonate salt to convert it to the sulphate or soluble form of that salt. Thus the dry bicarbonate is treated with a slight excess of 6% sulphuric acid. To a 15% water solution of this sulphate of aminoguanidine, while still acid from the excess of sulphuric acid, I add a 45% aqueous solution of sodium nitrite and allow the two solutions to react at a temperature between 30 and 50° C. for a period of 1 to 2 hours, when the reaction is complete. The solid residue is then washed with water and then with alcohol and dried at room temperature, or somewhat higher, from 5 to 10 hours, depending on operating conditions. The chemical structure of the resultant product is complex. Throughout this specification I designate it as tetrazene. The material is apparently one species of the generic class of compounds sometimes called tetrazenes and has been designated by the term guanylnitroso-aminoguanyltetrazene. Thus in French Patent No. 671,800 to Rathsburg et al., dated September 9, 1929, the name tetrazene is used as synonymous with guanylnitroso - amino - guanyltetrazene, though it must be recognized that tetrazene is the genus of which the alleged synonym is but one of scores of species.

To make primers from the ingredients above tabulated, those ingredients are first thoroughly and homogeneously mixed. The mixture is then poured into individual pellets of the proper size for the individual charges, all in a custom-

ary way, as by means of a charge plate provided with perforations adapted to mold pellets of the proper size. These pellets are then loaded into primer cups in the usual way and the primer cups are then assembled in the cartridge cases.

The priming mixture forming the subject matter of the present invention may also be employed in rim fire cartridges and without substantial change in the illustrative proportions above set forth, excepting for the addition of say 20% of ground glass, the latter being a common constituent of rim fire mixtures where it serves as an abrasive in a manner well understood in the art. With rim fire mixtures as with center fire mixtures, changes may be made in the relative percentages of the initiator, the sensitizer, the oxidizer, and the fuel, to correlate the priming mixture to the size of the shell and to the nature and amount of powder used therein. The rim fire mixture is prepared in the usual way, poured into individual pellets of the proper size for the individual charges by means of a charge plate and then transferred to empty rim fire cartridge shells. The priming mixture is then forced to distribute itself into the hollow rim of the cartridge shell by spinning the shell in the customary machine. The shells are then loaded with powder and bullets in the customary way.

The oxygen supplying elements and fuels mentioned above are referred to by way of example. Known equivalents may be substituted for any or all of them without departing from the spirit of the invention. As an example, lead nitrate may be employed in place of barium nitrate, the quantity of lead nitrate to be employed varying slightly from the quantity of barium nitrate given above to obtain substantially the same qualities in the resulting mixture.

I claim:

1. A priming mixture for small arms ammunition comprising normal lead azide, suitable oxidizers and fuels and tetrazene.

2. A priming mixture for small arms ammunition comprising normal lead azide, barium nitrate, lead peroxide and tetrazene.

3. A priming mixture for small arms ammunition comprising normal lead azide, barium nitrate, lead peroxide, calcium silicide, antimony sulphide and tetrazene.

4. A priming mixture for small arms ammunition comprising normal lead azide, tetrazene, barium nitrate, lead peroxide, antimony sulphide, calcium silicide and lead sulphocyanide.

5. A priming mixture for small arms ammunition comprising 10% to 20% normal lead azide, 20% to 30% barium nitrate, 15% to 25% lead peroxide, 15% to 25% antimony sulphide, 5% to 15% calcium silicide, 10% to 20% lead sulphocyanide and 1% to 5% of tetrazene.

6. A priming mixture for small arms ammunition consisting essentially of about 12% normal lead azide, 3% tetrazene, 23% barium nitrate, 20% lead peroxide, 20% antimony sulphide, 10% calcium silicide and 12% lead sulphocyanide.

7. A priming mixture for small arms ammunition consisting essentially of normal lead azide, tetrazene, barium nitrate, lead peroxide, antimony sulphide, calcium silicide, lead sulphocyanide, and ground glass.

8. An improved priming mixture for small arms ammunition comprising lead azide, guanylnitrosoaminoguanyltetrazene, barium nitrate and a fuel.

9. An improved priming mixture for small arms ammunition comprising lead azide, guanylnitrosoaminoguanyltetrazene, barium nitrate, and calcium silicide.

10. A priming mixture for ammunition primers comprising guanylnitrosoaminoguanyltetrazene and lead azide.

11. An improved priming composition comprising lead azide, guanylnitrosoaminoguanyltetrazene, barium nitrate and a fuel in which the lead azide content is from 10 to 20 percent and the guanylnitrosoaminoguanyltetrazene content is from 1 to 5 percent of the total mix.

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