

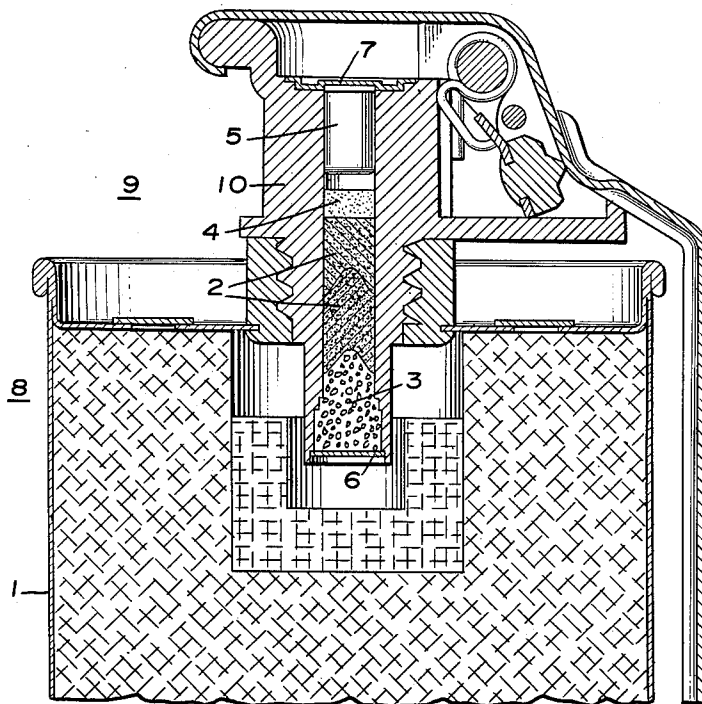
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IGNITION MIXTURE

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IGNITION MIXTURE

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No. 339,501

2 Claims. (Cl. 52—2)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to a new type of fuze and novel compositions used therein, particularly adapted for use with firing devices of the type generally used with smoke candles, gas grenades, floating smoke pots and similar munitions.

Compositions heretofore used in powder trains had several disadvantages such as instability due to presence of moisture, backfiring due to lack of slag forming material and sensitivity to shock and friction.

Briefly stated, the powder train compositions in one of the embodiments of our invention comprises a primer, first fire charge, a delay charge and an ignition charge, all placed into the central bore of the fuze body.

One of the objects of this invention is to provide a first fire charge, which will be extremely easy to ignite from primer or powder flash and yet not sensitive enough to frictional impact to cause undue hazard in mixing or pressing procedures. This charge must be relatively gasless and have a high burning temperature to act as a relay between a primer and some less sensitive material such as the delay charge.

Another object of this invention is to provide a material which will not deteriorate in storage at high temperatures and humidities and also possess the usual physical requirements as to ease of mixing, ability to flow and to pelleting.

Another object of this invention is to provide a delay charge that would meet the following requirements: It should be gasless, non-hygroscopic and, on burning, should leave a plug-forming residue. It should be insensitive to friction and impact and should possess ease of ignition and propagation with ability to be granulated and pelleted and it should burn with sufficient heat to ignite starter mixtures. The speed of burning should be adjustable by varying proportions of the ingredients.

Another object of this invention is to provide an ignition charge that would be non-hygroscopic, withstand long periods of storage under severe conditions of temperature and humidity, be readily ignitable, yet neither friction or impact sensitive to the degree causing the compounding to be hazardous for safe manufacture. It must possess a high burning temperature with a large amount of gas and flash so as to be able to ignite the various materials used with it as starter mixes in munitions of various types.

The fuze of one of the embodiments of our invention is easily manufactured, exhibits better over all functioning both before and after extreme storage conditions and will withstand immersion in water for at least four hours.

Other objects of this invention will be apparent to those skilled in the art upon reading the specification in conjunction with the accompanying drawing in which the single figure is a vertical section of the top portion of a grenade provided with a fuze incorporating the various features of this invention.

Referring to the drawing, a grenade is indicated gen-

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erally at 8, provided with a fuze indicated generally at 9. Except for the powder train, to which this invention particularly pertains the fuze 8 is of the type heretofore utilized by the Army in connection with various types of munitions and is described on pages 299-307 of "Chemicals in War" by A. M. Prentiss edited by McGraw-Hill Book Co. Inc., New York & London 1937.

The preferred composition of the first fire charge 4 comprises:

	Percent
10 Red lead -----	53.3±2
Silicon -----	33.7±2
Manganese -----	11.2±1
Celluloid -----	1.8±0.2

15 It was found in practice that this mixture is extremely easy to ignite from primer or powder flash while at the same time it is not sensitive to frictional impact during mixing and pressing operations. It is gasless and has a high burning temperature so that it acts as a relay between a primer and the delay charge. This material was found to be stable in storage under severe conditions of temperature and humidity. The specific proportions appear to be critical.

25 In the preferred embodiment of this invention, the delay charge mixture comprises essentially of dry litharge and powdered silicon in the ratio of 4 to 1. Since commercial grades of these materials are used the method of controlling the burning time is accomplished by the addition of varying amounts of inert material such as fuller's earth. 0.5% of powdered graphite may be added to the granulated material in order to reduce abrasion of pelleting dies.

30 As an example of one embodiment of this invention our final improved composition of the charge delay 2 comprises:

	Percent
35 Litharge -----	76.9
Silicon -----	19.3
Fuller's earth -----	1.5
40 Celluloid -----	1.8
Graphite -----	0.5

This composition was found to withstand tropical storage for at least 3 months with 96.9% functioning. It is pelleted and loaded into the fuse 9 in the manner described hereinafter.

45 Burning time of this delay mixture can be varied by changing the proportions of litharge and silicon within the range of from 20% silicon-80% litharge to 5% silicon-95% litharge. This property enables this mixture to be used in other types of munitions.

50 The delay charge of this type, when burned, leaves a heavy slag to serve as a plug and to prevent backfiring in this type of fuze.

55 The ignition charge 3 forms one of the embodiments of our invention and comprises an intimate mixture of

	Percent by weight
60 Lead chromate -----	59±5
Silicon -----	19.6±3
Magnesium -----	19.6±3
Celluloid -----	1.8±0.2

65 This mixture is non-hygroscopic and is capable of withstanding long periods of storage under severe conditions of temperature and humidity. It is readily ignitable, but insensitive to friction or impact, thus eliminating the hazards of processing steps. This material must be in granular form and must flow readily to facilitate loading. In manufacture, this composition is mixed dry in the presence of approximately 20% by weight of an 8% solution of Celluloid sheet in acetone. While still moist, this material is granulated and allowed to dry.

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This composition replaces the usual black powder ordinarily used in fuzes of this type. It gives a large flash and a large amount of gas.

The size of the flash obtained from this ignition charge can be varied by changing the particle size of the granulated mixture within the range of from through 20 mesh to held on 200 mesh. The larger particle size produces the greater flash.

In the preferred embodiment of this invention, the loading of the igniter fuze 9 is effected in the following manner.

The fire charge 4 in a form of a small pellet ($0.188'' \pm .008''$ in diameter weighing 0.300 to 0.400 gram, $0.200'' \pm .010''$ in height) and a pellet of charge delay 2 (weighing $0.600 \pm .050$ grams, $0.300'' \pm .015''$ in height and $0.008''$ in diameter) are pressed in place beneath the primer 5 in the fuze body 10 under a dead load pressure of 400-600 lbs. Another delay charge pellet 2 is added and consolidated in the same manner, as shown. In order to improve the propagation of burning, a keyed ram tip is used for the pressing operations.

This is followed by a loose mixture of ignition charge 3 sufficient to fill the cavity. A closing disc 6 is then crimped in place and the whole is waterproofed with a solution of 40% wax material in a mixture of benzol and toluene (equal parts by weight) by brush application as is well known in this art.

The top portion of the fuse is protected by an aluminum foil disc 7 stamped into the fuze body and its periphery sealed with a coat of wax and shellac varnish.

The fuze 9 is then assembled, as shown, with striker,

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lever, etc., in accordance with the normal procedure well known in this art.

The fuze of this invention is economical to manufacture and exhibits better overall functioning both before and after extreme storage conditions. It with withstand immersion in water for at least 4 hours without showing any defects in use.

In the foregoing description we described the preferred embodiment of the invention without confining ourselves to the precise details set forth by way of illustration, as it is apparent that many changes and variations may be made therein by those skilled in the art, without departing from the spirit of the invention or exceeding the scope of the appended claims.

This application is a division of application Serial No. 581,538, filed March 7, 1945, now Patent No. 2,643,946. We claim:

1. An ignition mixture composed of lead chromate 59%, silicon 19.6%, magnesium 19.6%, and Celluloid, 1.8%.

2. The composition of claim 1 in which the particle size is in the range of from through 20 mesh to held on 200 mesh.

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