Aug. 3, 1943. LE ROY V. CLARK 2,325,742

INITIATOR AND CAP

Filed March 20, 1940

Fig. 1.

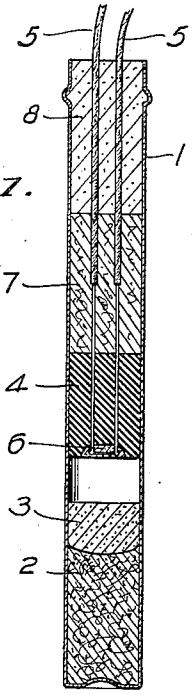


Fig. 2.

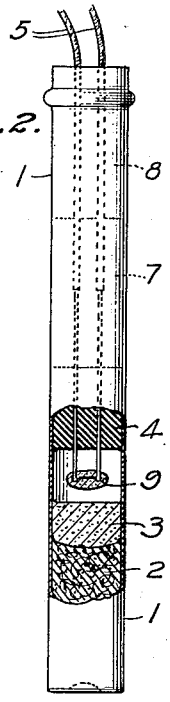


Fig. 3.

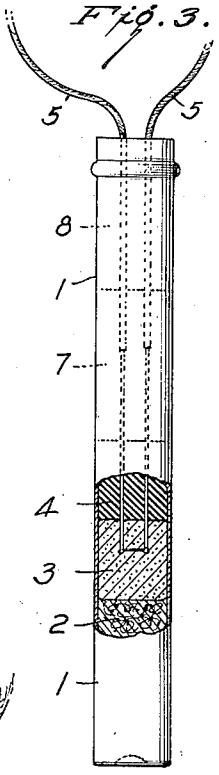


Fig. 4.

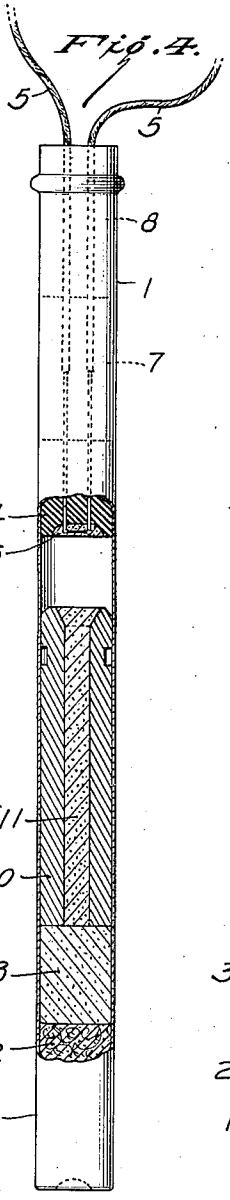


Fig. 5.

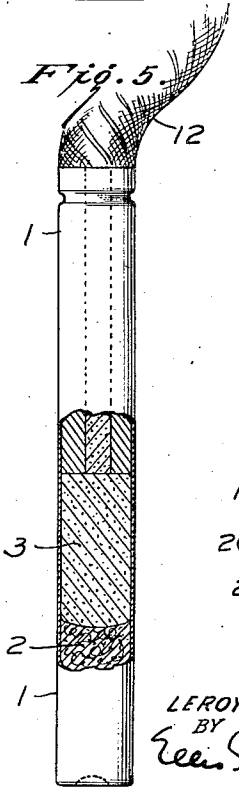


Fig. 6.

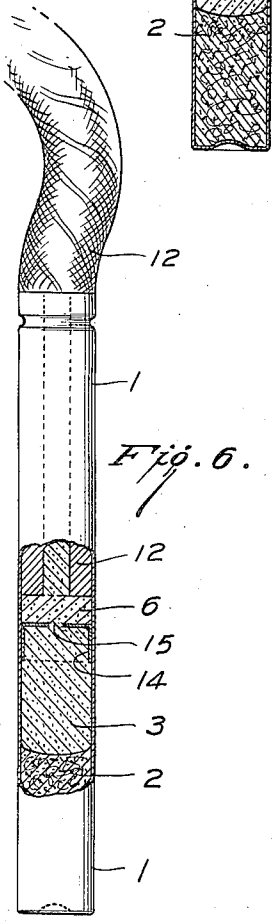


Fig. 7.

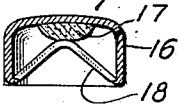
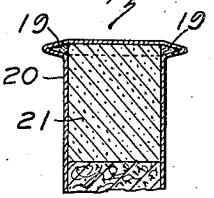


Fig. 8.



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2,325,742

INITIATOR AND CAP

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Application March 20, 1940, Serial No. 324,906

4 Claims. (Cl. 52—4)

The present invention relates to the use of heavy metal salts of nitroaminoguanidine and particularly those of lead, copper and barium, listed in the order of their preference, as an ignition, an initiator or primary charge, or as an ingredient thereof.

It is common practice to use in ammunition and blasting caps a primer, ignition, or initiating charge as diazodinitrophenol, mercury fulminate or lead azide or a composition including one or more of these substances. The primary object of the present invention is to replace in whole or in part such substance with a heavy metal salt of nitroaminoguanidine because of its ease of handling, simplicity of manufacturing, cheaper cost and the fact that the physical nature thereof makes it more desirable for this purpose.

The use of the invention is diagrammatically illustrated in the drawing in which—

Figs. 1, 2 and 3 are sectional views of forms of electric blasting caps embodying the invention;

Fig. 4 is a similar view of a delay electric blasting cap using the present heavy metal salt as an igniter and/or an initiating charge;

Figs. 5 and 6 are sectional elevations of fuse caps using the present improvement;

Fig. 7 is a sectional view of an ammunition primer of the center fire type; and

Fig. 8 is a similar view of ammunition of the rim fire type.

A heavy metal salt of nitroaminoguanidine may be prepared as follows:

165 grams of hydrazine sulfate is dissolved in 3500 cc. of ammonium hydroxide solution (1 N). 135 grams of nitroguanidine is added over a period of approximately 15 minutes with mild agitation. The mixture is stirred at 40° C. for one hour and then at 65° C. for an additional hour and finally vacuum concentrated to 600 cc. Upon cooling to 15° C., crystals of nitroaminoguanidine are precipitated.

To a quantity of nitroaminoguanidine in water at 60–70° C. an equal weight of the hydroxide of the metal salt desired is added and rapidly agitated for fifteen minutes, whereupon crystals of the corresponding heavy metal salt precipitate. They may be be washed with alcohol and dried at 35° C.

Any heavy metal salt of nitroaminoguanidine may be thus prepared, although those of lead, copper and barium are preferred in the order listed because of their greater suitability for the use specified.

Referring now to the drawing,

Fig. 1 shows an electric blasting cap including the usual cylindrical metal casing 1 containing the secondary or base charge 2 of any well known composition and with or without a primary initiating charge 3 comprising a heavy metal salt of nitroaminoguanidine either alone or in admixture. The plug 4, of suitable insulating material through which the electric lead wires 5 pass, is provided with a depression into which is affixed an ignition charge 6 which includes a heavy metal salt of nitroaminoguanidine either alone or in admixture. A fine ignition wire extends between the ends of the lead wires 5 and is embedded in the initiator charge.

Above the plug 4 is a suitable waterproof composition 7 and a seal of sulfur or the like 8 as is usual for the purpose of embedding the lead in wires, retaining the various compositions within the casing and preventing the leakage of moisture thereinto.

Fig. 2 is similar in construction to that of Fig. 1 except that the ignition charge is in the form of a match head 9 carried by the end of the lead in wires 5.

In Fig. 3, a similar construction is shown but in this modification the primary initiating charge 3 is a loose fill between the secondary or base charge 2 and the plug 4. In this modification the lower portion of charge 3 adjacent to the top of charge 2 may be subjected to pressure.

Fig. 4 illustrates a delay electric blasting cap in which a delay element 10 of the usual type containing a delay composition 11 is superimposed upon the primary initiating charge 3 which is in turn superimposed upon the secondary or base charge 2. In this case, the ignition charge 6, while shown in the form illustrated in Fig. 1, obviously may be either that of Fig. 2 or Fig. 3.

Fig. 5 shows a cap of the fuse type in which a flexible fuse 12 is crimped into the casing 1 and in contact with a primary initiating charge 3 which consists of a heavy metal salt of nitroaminoguanidine either alone or in admixture, and which is superimposed upon a secondary or base charge 2.

In Fig. 6 a similar construction is shown but in this modification, the ignition charge 6, which may comprise a heavy metal salt of nitroaminoguanidine either alone or in admixture, and a reenforcing insert or capsule 14 having an aperture 15, have been placed between the end of the fuse 12 and the primary initiating charge 3.

Fig. 7 illustrates an igniter or primer cap for

center fire ammunition. Here, a short casing 16 is provided with a primer composition 17 including a heavy metal salt of nitroaminoguanidine held between the top of the casing and an anvil 18. When such a cap is incorporated in the ammunition shell, the firing pin of the weapon causes the primer charge to fire by pinching it between the casing and the anvil and so ignites the propellant charge in the ammunition shell in the usual manner.

In Fig. 8, the primer composition of the present invention is shown at 19 and located between the folded periphery of casing 20 in rim fire ammunition. In this case, the firing pin of the weapon fires the primer composition by pinching it between the folded rim of the shell itself, thus igniting the propellant charge 21 as usual.

In all of the above cases, it is understood that the initiator, ignition or primary charge shall include a heavy metal salt of nitroaminoguanidine, those of lead, copper and barium being preferred in the order listed. Mixtures of these compositions may be used. Such a composition may be used for any purpose for which mercury fulminate or any other primary detonant is useful.

In the claims, where the initiator charge is referred to, it is intended to include also an ignition and/or primary charge as above described, as these types of charges are considered to be the equivalent for patent purposes.

While the invention has been shown and described with particular reference to specific embodiments, it is to be understood that it is not to be limited thereto but is to be construed broadly and restricted solely by the scope of the appended claims.

I claim:

1. An initiator charge for detonating purposes including a heavy metal salt of nitroaminoguanidine.

2. An initiator charge for detonating purposes including lead nitroaminoguanidine.

3. An initiator charge for detonating purposes including copper nitroaminoguanidine.

4. An initiator charge for detonating purposes including barium nitroaminoguanidine.

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