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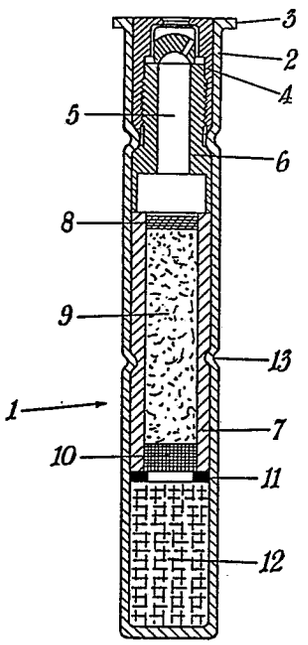
(71) Applicant: **SIPE NOBEL Società Italiana Esplodenti S.p.A., Via Sicilia 162, I-00187 Rome (IT)**

(72) Inventor: **Campagni, Aldo, Via Vignolese 80, Spilamberto Modena (IT)**

(74) Representative: **de Simone, Domenico et al, Ing. Barzanò & Zanardo Roma S.p.A. Via Piemonte 26, I-00187 Roma (IT)**

(54) A delay detonator and a process for producing the same.

(57) A delay detonator comprising a small outer powder case (2), two metal parts of brass (4, 6) in which the percussion cap (5) is housed, which cap (5) acts as a primer, a small tube (7) in which the priming charge (8), the delaying mixture (9) and the outlet charge (10) are provided, and a fish paper gasket (11) between said small tube (7) and the main charge of secondary explosive (12), and a process for the production of said delay detonator, in which process the delaying mixture is charged with at least seven increments, each one of them being pressed with an automatic block compensated head press to that if the mixture metering is not of the predetermined amount, the charging operation stops automatically.



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A DELAY DETONATOR AND A PROCESS FOR PRODUCING THE SAME

The present invention relates to a delay detonator as well as to the process for producing the same.

More particularly, the present invention relates to a detonator whose average delay time is of about 4 seconds. Moveover, the present invention relates to a process for the production of said detonator, said process making it possible to perform safety controls in order to ensure the effective presence of the delaying mixture so avoiding almost instantaneous operation of said detonator.

Indeed, it is evident that a detonator of the type which is the object of the present invention satisfies a necessity in particular for the production of hand grenades.

It has been found for such purposes according to the present invention that if the delaying mixture is charged into the metal housing with successive increments, advantageously at least seven increments, which are pressed into their place by means of a compensated head press which automatically stops in case of unevenness in the delaying mixture metering, the insertion is avoided into the detonator of a grain giving an incomplete delay action, which would give an almost instantaneous operation.

A second type of control action is obtained through the addition of the outlet charge, for instance lead azide, by compressing the same direct onto the delaying mixture so that the control is obtained of the effective presence of said mixture.

Moreover, the process for the production of the detonator, of according to the present invention also provides a third

safety control level owing to the fact that, by introducing the delaying tube into the small powder case of the detonator, the actual presence of the mixture in the same can be controlled visually.

Thus, it is a specific object of the present invention a delay detonator characterized in that it comprises a small outer charge case which is provided with a flange and, in its central position, with a check groove, a first metal part, which preferentially consists of brass, in which the priming percussion cap is housed, a second metal part for supporting said cap, said metal part being preferably also made up of brass and connected to said first metal part, a small tube containing the priming mixture, the delaying mixture and the outlet charge, and the main charge of the secondary explosive, gasket means being provided between said small tube and said main charge.

By preference said small tube is of a diameter variable between 4 and 5 mm, and more particularly it is of a diameter of 4,5 mm.

According to a preferred embodiment of the detonator of the present invention, said priming mixture is made up of a 12/88 boron/barium chromate mixture granulated with vinyl alcohol-acetate, the delaying mixture is the mixture according to the standard specification PA-PT-22, and the outlet charge is made up of the lead azide of the standard specification MIL-L-3055A.

Again according to the present invention, said main charge of the secondary explosive is made up of a charge of nitropentaerythritol (standard specification ML-P-387A).

According to a particularly preferred embodiment of the detonator of the present invention, said gasket means consist of a fish paper washer or of a rubber O-ring.

Moreover, it is a specific object of the present invention a

process for the production of a delay detonator, said process being characterized in that:

a) the delaying grain is introduced into the metal housing with at least seven increments of the delaying mixture, each of them being pressed into its place by means of a compensated head press capable of automatically stopping in case of lack or of a decreased amount of one only of said increments; b) the outlet charge is added by compressing the same direct onto the delaying charge; and c) the small tube which bears the delaying charge is inserted into the small powder case of the detonator.

Thus, by introducing the primary explosive of the delaying charge direct into said delay-bearing tube, and providing in addition the fish paper gasket or the rubber O-ring at the contact surface of the tube itself with the secondary explosive and the checking groove centrally on said small outer case, any accidental priming of the main charge is surely prevented from occuring.

The present invention will be disclosed in the following with particular reference to the enclosed drawing which shows a partially schematic longitudinal cross section of an assembly view of the detonator according to the present invention.

The detonator 1 according to the invention comprises a small outer case 2 of aluminum provided with a flange 3, in the upper inside of which a first metal part 4 is provided which consists of brass and bears the seat or housing of the priming percussion cap 5.

A second metal part 6 of brass is provided, which is joined to said first part 4 by means of a screw thread, said second part acting as a rest base for the priming cap 5 and also as a spacer.

The small brass tube 7 of inside diameter of 4.5 mm is loaded with

the priming mixture 8 which is made up of a 12/88 boron/barium chromate mixture granulated with a vinyl alcohol-acetate resin, with eight increments of the delaying mixture 9 which is of the type of standard specification PA-PT-23, and, within a short distance at the end of the delaying column, with the outlet charge 10 of lead azide (standard specification MIL-L-3055 A).

The fish paper washer 11 acts as a contact gasket between the small tube 7 and the underlying main charge 12. Said charge 12 consists of the secondary explosive nitropentaerythritol of the standard specification MIL-P-387A.

Said small outer case 2 is also provided at a position corresponding to the small tube 7 of a check groove 13.

On percussion of the cap 5, the priming mixture 8 is primed which in turn causes the ignition of the delaying mixture 9. The combustion of said mixture 9 occurs in an average time of 4 seconds this time being variable between 3.5 and 4.5 seconds), and thereafter the charge 10 is primed which, by detonating, primes the main charge 12 of nitropentaerythritol.

The present invention has been disclosed for illustrative but not for limitative purposes, according to some of its preferred embodiments, but it is to be understood the modifications and changes can also be introduced in the present invention by those who are skilled in the art without departing from the spirit and scope of the invention for which a priority right is claimed.

CLAIMS:

1. A delay detonator, characterized in that it comprises a small outer powder case having a flange and provided at its center position with a check groove, a first metal part in which the priming percussion cap is housed, a second metal part for supporting said cap, said second part being connected to said first metal part, a small tube containing the priming mixture, the delaying mixture and the outlet charge, and the main charge of the secondary explosive, gasket means being provided between said small tube and said main charge.

2. A delay detonator according to claim 1, characterized in that said first metal part, said second metal part and said small tube are made up of brass.

3. A delay detonator according to claims 1 or 2, characterized in that said small tube has a diameter variable between 4 and 5 mm, more particularly of 4.5 mm.

4. A delay detonator according to claim 1, characterized in that said priming mixture is made up of a 12/88 boron/barium chromate mixture granulated with vinyl alcohol-acetate, the delaying mixture being made up of the mixture corresponding to the standard specification PA-PT-23 and the outlet charge being made up of lead azide corresponding to the standard specification MIL-L-3055 A.

5. A delay detonator according to claim 1, characterized in that said main charge of the secondary explosive is made up of a nitropentaerythritol charge.

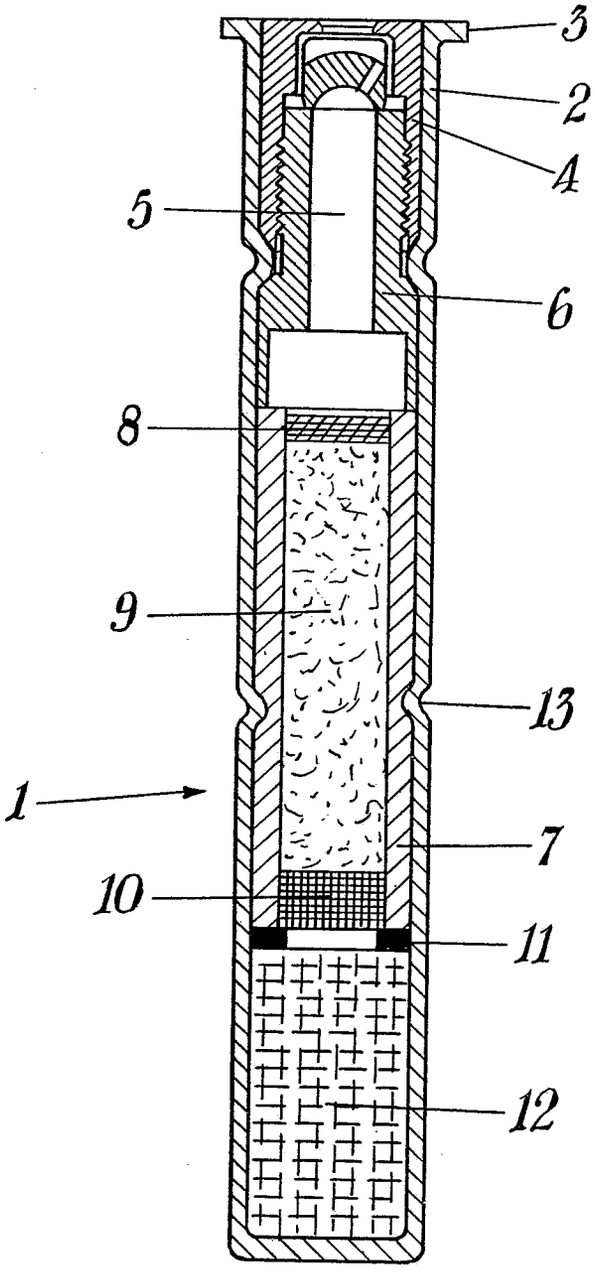
6. A delay detonator according to claim 1, characterized in that said gasket means consist of a fish paper washer or of a rubber

O-ring.

7. A process for the production of a delay detonator according to claims 1-6, characterized in that:

a) the delaying grain is introduced into the metal seat or housing with at least seven increments of the delaying mixture, each one of them is pressed into its place by means of a compensated head press capable of automatically stopping in case of lack or reduction of the amount of just one only of said increments; b) the outlet charge is added by compressing the same direct onto the delaying charge; and c) the small tube bearing the delaying charge is inserted into the small powder case of the detonator.

8. A delay detonator and a process for producing the same according to any one of the preceding claims and substantially as illustrated and disclosed above.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