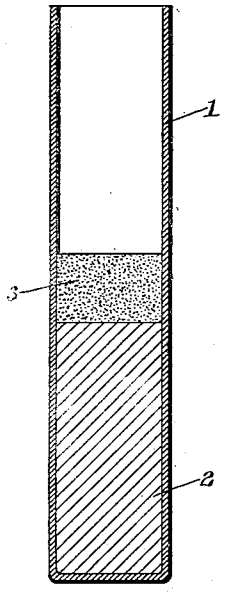
W. RUNGE.

DETONATOR.

APPLICATION FILED JUNE 30, 1913.

1,185,830. Patented June 6, 1916.



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UNITED STATES PATENT OFFICE.

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DETONATOR.

1,185,830. Specification of Letters Patent. Patented June 6, 1916.

Application filed June 30, 1913. Serial No. 776,708.

To all whom it may concern:

Be it known that I, WALTER RUNGE, of Chester, in the county of Delaware, and in the State of Pennsylvania, have invented a certain new and useful Improvement in Detonators, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates particularly to an improvement in the preparation of detonator compositions and the arrangement thereof in explosive charges.

Hitherto detonators have been made by the use of fulminate of mercury or a mixture of fulminate of mercury and potassium chlorate. These were for some time the only detonators used for detonating dynamite and other high explosives. In recent years, however, they have been replaced to a certain extent by detonators containing a main charge which cannot be detonated by the flame from a fuse and a priming charge of an explosive which can be detonated by a fuse. The explosion of the priming charge detonates the main charge so that the detonation from the main charge causes the explosion of the main body of explosive. For the main charge explosives such as trinitrotoluene and picric acid have been used. For the priming charge the fulminate of mercury has been replaced to some extent by lead azid. In detonators of this type in which there is a main charge and a priming charge it has hitherto been found necessary to cover the priming charge with a perforated capsule or thimble to increase the detonating power of the priming charge, owing to the confinement, and to prevent the loosening of the priming charge in the metal casing.

I have discovered that where detonators containing lead azid are used it is not necessary to provide a confining capsule or thimble to increase the detonating power of the priming charge. I have thus discovered that in detonators of this character the confining capsule or thimble may be entirely omitted and that the priming charge may be effectually retained in position by adding to the explosives in the priming charge a suitable binder. Such binder will not only cause the particles of explosives in the priming charge to adhere or cohere to one another, but will cause them to become fastened securely in place within the metal capsule. The amount of binder necessary does not diminish the detonating power of the priming charge.

While my invention is capable of embodiment in many different forms, for the purpose of illustration I may produce a detonator in the following way; the accompanying drawing illustrating one form of my invention, in which the figure is a vertical section of a detonator made in accordance with my invention.

In the drawings, I have shown a metal casing 1 having a main charge 2 and a priming charge 3.

The main charge 2 may consist of 1 gram of trinitrotoluene. This may be pressed into the metal casing 1 of the detonator before the addition of the priming charge 3, or it may be pressed into the same simultaneously with the priming charge. On top of the main charge I place a priming charge consisting, for example, of 0.3 gram of a mixture of 80 parts of lead azid and 20 parts of trinitrotoluene to which has been added a small amount of a binder, such, for example, as gum arabic. The proportions of lead azid, trinitrotoluene and gum arabic may, however, vary, but I preferably use from 70 to 95 parts of lead azid and from 5 to 30 parts of trinitrotoluene and from 0.02 to 0.4 parts of gum arabic. The caps consisting of the main charge and the priming charge are then pressed in any suitable way. If desired, they may be pressed simultaneously in one pressing operation or they may be pressed separately. When pressed the detonating compositions will be effectively retained within the metal casing. The priming charge may be retained in place by the gum arabic. When so arranged it is not necessary to make use of a perforated capsule on top of the priming charge as was previously found necessary.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of my invention, and that the terms used therein shall be interpreted in their broad significance. For example, the word detonator is to be understood as including among other devices dynamite caps which are to be ignited by a flame from a fuse, as well as electric detonators in which the charge is ignited by an electric current.

I claim:

1. A detonator comprising a casing, a main charge of an explosive which cannot be detonated directly by the flame from a fuse, and a priming charge containing a mixture of lead azid and an organic nitro compound, unobstructed at one end thereof.

2. A detonator comprising a casing, a main charge of an explosive which cannot be detonated directly by the flame from a fuse, and a priming charge containing lead azid, an organic nitro compound and a binding material, unobstructed at one end thereof.

3. A detonator comprising a casing, a main charge of an explosive which cannot be detonated directly by the flame from a fuse, and a priming charge containing a mixture of lead azid and trinitrotoluol, unobstructed at one end thereof.

4. A detonator comprising a casing, a main charge of an explosive which cannot be detonated directly by the flame from a fuse, and a priming charge containing lead azid, trinitrotoluol and a binding material, unobstructed at one end thereof.

5. A detonator comprising a casing, a main charge of an explosive which cannot be detonated directly by the flame from a fuse, and a priming charge containing lead azid, trinitrotoluol, and gum arabic, unobstructed at one end thereof.

6. A detonator comprising a casing, a main charge of an explosive which cannot be detonated directly by the flame from a fuse, and a priming charge containing 70 to 95 parts of lead azid, 5 to 30 parts of trinitrotoluol, and .02 to .4 parts of gum arabic, unobstructed at one end thereof.

7. A detonator comprising a casing, a main charge of trinitrotoluol, and a priming charge containing a mixture of lead azid and an organic nitro compound, unobstructed at one end thereof.

8. A detonator comprising a casing, a main charge of trinitrotoluol, and a priming charge containing lead azid, an organic nitro compound and a binding material, unobstructed at one end thereof.

9. A detonator comprising a casing, a main charge of trinitrotoluol, and a priming charge containing a mixture of lead azid and trinitrotoluol, unobstructed at one end thereof.

10. A detonator comprising a casing, a main charge of trinitrotoluol, and a priming charge containing lead azid, trinitrotoluol and a binding material, unobstructed at one end thereof.

11. A detonator comprising a casing, a main charge of trinitrotoluol, and a priming charge containing lead azid, trinitrotoluol and gum arabic, unobstructed at one end thereof.

12. A detonator comprising a casing, a main charge of trinitrotoluol, and a priming charge containing 70 to 95 parts of lead azid, 5 to 30 parts of trinitrotoluol, and .02 to .4 parts of gum arabic, unobstructed at one end thereof.

In testimony that I claim the foregoing I have hereunto set my hand.

WALTER RUNGE.

Witnesses:
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