Nov. 21, 1967 H. STADLER ET AL 3,353,488

PRIMER FOR IMPACT FUSES

Filed Sept. 27, 1965

FIG. 1a

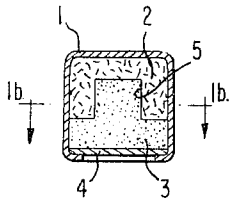


FIG. 1b

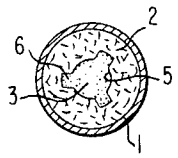
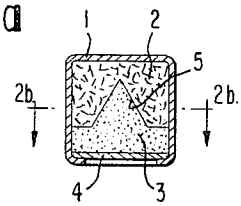


FIG. 2a



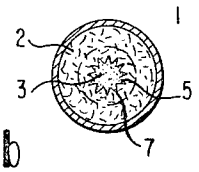


FIG. 2b

FIG. 3a

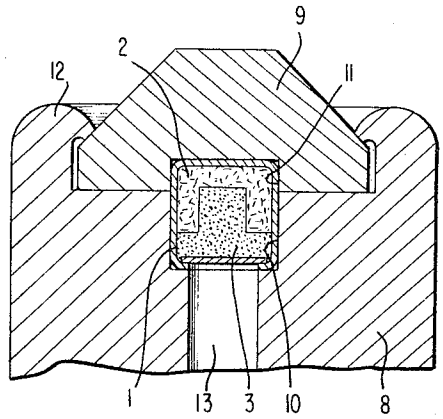
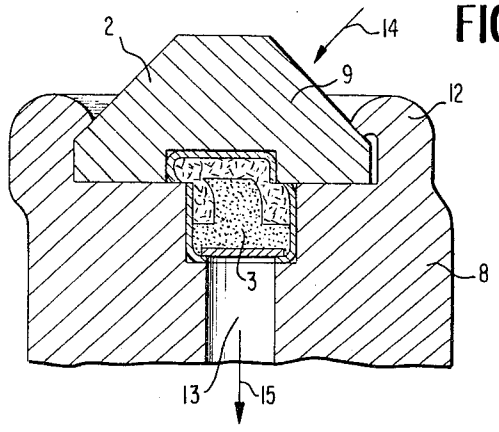


FIG. 3b



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United States Patent Office 3,353,488 Patented Nov. 21, 1967

3,353,488

PRIMER FOR IMPACT FUSES

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Filed Sept. 27, 1965, Ser. No. 490,261
15 Claims. (Cl. 102—73)

ABSTRACT OF THE DISCLOSURE

A primer for impact fuses reliable in operation independent of any predetermined impact direction of the fuse. A friction-sensitive ignition composition is pressed into a capsule open on one end so as to form a central recess in the composition facing the open end of the capsule. A friction material such as powdered glass fills the remainder of the capsule including the recess.

The present invention relates to a primer and more particularly to a primer assembly for percussion fuses or impact detonators.

For impact fuses that are intended to respond independently of a predetermined impact direction, those known primers are not suited whose ignition takes place by means of a piercing needle or other known puncturing means since there exists then the danger that with a corresponding, especially inclined impact of the fuse, the needle is bent or breaks which may have as a consequence that it does not hit the ignition composition and thus leads to a failure of the fuse or detonator. The same is also true for primers with an anvil serving as counter abutment; for also with these known types of primers there exists the danger that the anvil is laterally displaced with an oblique impact of the fuse and therewith does not fulfill its function as counter abutment whereby also in this case no ignition of the primer occurs and the fuse fails accordingly.

The present invention aims at creating for impact detonators or percussion fuses, a primer which is as simple as possible in its construction but reliable in its operation and especially independent in its response of any predetermined impact direction of the fuse. Accordingly, the present invention proposes for a primer intended as impact fuse, which has an impact and friction sensitive ignition composition accommodated in a capsule open on one side, to press the ignition composition into the bottom part of the capsule while leaving a central recess in the direction toward the open side of the capsule and to fill the rest of the capsule with a pressed-on friction material, preferably glass powder or the like. A primer thus constructed reacts to any deformation in a very sensitive manner whereby the part of the friction material extending into the ignition mass fulfills the function of a piercing needle effective in all directions so that it is completely irrelevant for the safe ignition of the primer from which side the deformation thereof is initiated, i.e., in which direction takes place the impact of the primer.

According to an appropriate further development and feature of the present ignition, it is proposed to construct the recess in the ignition composition either cylindrical or conical, and according to another proposal of the present invention the recess is constructed of profiled or sectional cross section whereby there is achieved a particularly good friction effect by the part of the friction means engaging into the recess and acting in the manner of a piercing needle.

Accordingly, it is an object of the present invention to provide a primer for impact fuses which is simple in construction yet eliminates the aforementioned shortcomings and drawbacks encountered with the prior art constructions.

It is another object of the present invention to provide a primer construction for impact fuses which operates reliably regardless of the direction of the impact.

A further object of the present invention resides in an impact fuse having a primer of such a construction as to eliminate substantially completely any failure due to faulty impact.

A still further object of the present invention resides in a primer which is simple in construction as well as easy to manufacture and assemble yet does not involve costly parts.

These and further objects, features, and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, several embodiments in accordance with the present invention, and wherein

FIGURE 1*a* is an axial cross-sectional view through a primer in accordance with the present invention having a cylindrically shaped recess provided in the ignition mass;

FIGURE 1*b* is a transverse cross-sectional view taken along line 1*b*—1*b* of FIGURE 1*a*;

FIGURE 2*a* is an axial cross-sectional view through a modified embodiment of a primer in accordance with the present invention having a conically shaped recess provided in the ignition mass;

FIGURE 2*b* is a transverse cross-sectional view taken along 2*b*—2*b* of FIGURE 2*a*;

FIGURE 3*a* is a partial cross-sectional view through an impact fuse using a primer illustrated in FIGURES 1*a* and 1*b*, with the parts in the normal position prior to an impact; and

FIGURE 3*b* is a cross-sectional view, similar to FIGURE 3*a*, and illustrating the various parts thereof after the occurrence of an impact.

Referring now to the drawing wherein like reference numerals are used through the various views thereof to designate like parts, and more particularly to FIGURES 1*a* and 1*b*, the capsule **1** illustrated therein consists preferably of metal or plastic material into which is pressed-in the ignition composition **2** in such a manner as to leave a central recess **5**. The ignition composition of this embodiment as well as of the other embodiments may be of any conventional, known composition, for example 5% tetrazene, 65% trizinate, 10% barium nitrate and 20% calcium silicide or of 60% trizinate, 15% barium nitrate and 25% antimony sulfide, all percents being by weight, though it is understood that any other known and suitable ignition composition may be used with the primer of the present invention. The recess **5** constructed with grooves **6** along the cylindrical circumference thereof as well as the rest of the capsule **1** is filled by means of the pressed-on friction material **3** for which may also be used, in addition to glass, quartz, corundum or other suitable minerals and materials having appropriate functional characteristics. The capsule **1** is covered toward the open side thereof by means of a foil **4** made preferably of metal or plastic material.

The primer of FIGURES 2*a* and 2*b* essentially corresponds to that of FIGURES 1*a* and 1*b*, only the recess **5** in this embodiment is of conical shape and is constructed with teeth **7** along the circumference thereof.

According to FIGURES 3*a* and 3*b*, a primer according to FIGURE 1*a* and FIGURE 1*b* is inserted into the recesses **10** and **11** of the fuse body **8** of the fuse cover plate **9**, held on the body **8** by means of flanged over rims **12**, with the open end of the capsule **1** facing the ignition channel **13**.

FIGURE 3*b* illustrates the condition which approximately results under the effect of the reaction forces schematically indicated by the arrow **14** with a corresponding inclined impact of the fuse. The forward end of the

fuse body **8** together with the fuse cover plate **9** has been displaced thereby toward the left and has effected a shearing off of the capsule **1**. At the same time, the ignition composition **2** and the friction material **3** have been deformed as a result of which the ignition of the primer has been initiated whose ignition flame penetrates now in the direction of the arrow **15** through the ignition channel **13**.

While we have shown and described several embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to a person skilled in the art. For example, the shearing-off of the capsule **1** illustrated in FIGURE 3*b* is not a necessary prerequisite for the completely satisfactory operation of the primer according to the present invention. Such completely satisfactory operation is already assured, and more particularly independently of the direction in which the deforming forces act on the primer, when the primer is subjected to only a relatively slight deformation; for also in that case, the friction material pressed in the form of a rigid core produces, by penetration into the ignition composition surface, the frictional heat necessary for ignition, whereby the ignition conditions are the more favorable the deeper the extension of the friction material projects into the primer.

Thus, it is obvious that the present invention is susceptible of numerous modifications and changes within the spirit and scope thereof, and we therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

We claim:

1. A primer for impact fuses comprising:
a capsule having a bottom part and open on one side thereof,
an impact- and friction-sensitive ignition composition accommodated in said capsule,
said ignition composition being pressed into the bottom part of the capsule in such a manner as to leave a substantially central recess in the direction toward the open capsule side,
and a pressed-on particulate friction material substantially filling the remainder of the capsule.

2. A primer according to claim **1**, wherein said friction material consists of ground glass in powder form.

3. A primer according to claim **1**, wherein said recess is of substantially cylindrical construction.

4. A primer according to claim **1**, wherein said recess is of substantially conical construction.

5. A primer for impact fuses comprising:
a capsule having a bottom part and open on one side thereof,
an impact- and friction-sensitive ignition composition accommodated in said capsule,
said ignition composition being pressed into the bottom part of the capsule in such a manner as to leave a substantially central recess in the direction toward the open capsule side,
and a pressed-on particulate friction material substantially filling the remainder of the capsule,
the recess being of profiled shape as viewed in cross section.

6. A primer according to claim **5**, wherein said recess is of substantially cylindrical construction.

7. A primer according to claim **5**, wherein said recess is of substantially conical construction.

8. A primer for impact fuses comprising:
a capsule having a bottom part and open on one side thereof,

an impact- and friction-sensitive ignition composition accommodated in said capsule,
said ignition composition being pressed into the bottom part of the capsule in such a manner as to leave a substantially central recess in the direction toward the open capsule side,
and a pressed-on particulate friction material substantially filling the remainder of the capsule,
and foil means covering the friction material in the direction toward the open capsule side.

9. A primer for impact fuses comprising:
a capsule having a bottom part and open on one side thereof,
an impact- and friction-sensitive ignition composition accommodated in said capsule,
said ignition composition being pressed into the bottom part of the capsule in such a manner as to leave a substantially central recess in the direction toward the open capsule side,
and a pressed-on particulate friction material substantially filling the remainder of the capsule,
the recess being of profiled shape as viewed in cross section,
and foil means covering the friction material in the direction toward the open capsule side.

10. A primer according to claim **9**, wherein said recess is of substantially cylindrical construction.

11. A primer according to claim **9**, wherein said recess is of substantially conical construction.

12. In a primer for an impact fuse, which is operable reliably substantially independently of the direction in which takes place the impact force and which includes a capsule open on one side thereof, and an impact- and friction-sensitive ignition composition accommodated in said capsule,
the improvement essentially consisting of said ignition composition, which is pressed into the bottom part of the capsule, is of such shape as to leave a recess in the direction toward the open capsule side, and a pressed-on particulate friction material filling the said recess and at least a portion of the remainder of the capsule.

13. The combination according to claim **12**, wherein said recess is located substantially centrally in said ignition composition and said material covers the exposed end face of said ignition composition.

14. The combination according to claim **12**, wherein said impact- and friction-sensitive material consists of powdered friction material pressed into a rigid core.

15. The combination according to claim **12**, wherein said ignition composition and said material include means in the form of irregular complementary surface portions to increase the area of contact surfaces thereof effective to initiate the ignition.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,353,488 November 21, 1967

Hans Stadler et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, between lines 6 and 7, insert the following:

Claims priority, application Germany, Oct. 10, 1964, D 45,601

Signed and sealed this 17th day of December 1968.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents