Nov. 17, 1959 J. G. BAKER 2,912,934

IMPACT DETONATING FUZE

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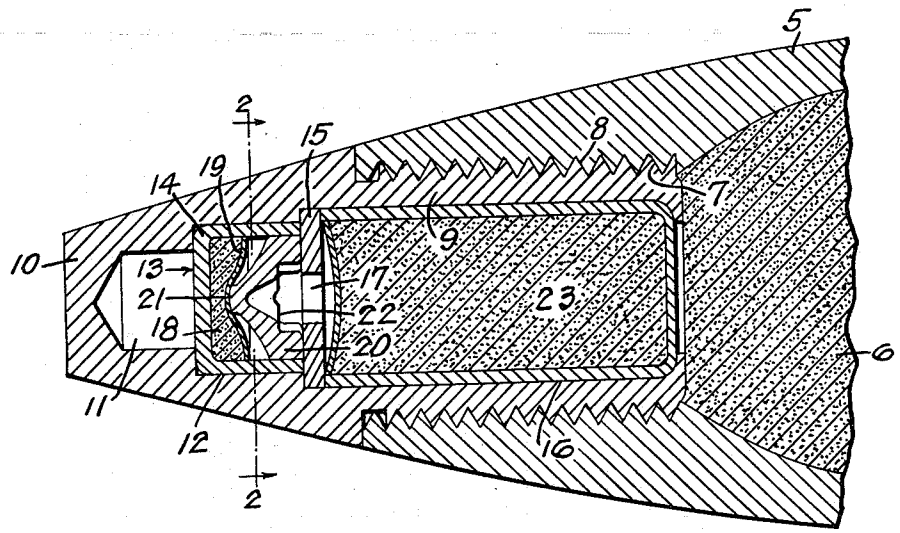
Fig. 1.



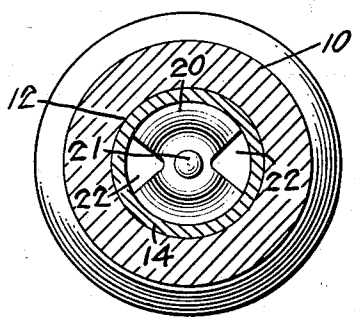


Fig. 2.

INVENTOR.

James G. Baker

BY

W. E. Thibodeau & T. J. Lynch

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IMPACT DETONATING FUZE

James G. Baker, Hamden, Conn., assignor to the United States of America as represented by the Secretary of the Army

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1 Claim. (Cl. 102—73)

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

This invention relates to fuzes for high velocity projectiles.

An object of the invention is to provide a fuze which is insensitive to shock caused by rough handling in transit or in the field.

Another object of the invention is to provide a fuze having a detonating anvil of such small mass that it will not ignite the primer except on impact with a target at high velocity.

A further object of the invention is to provide a fuze which utilizes the combined forces of shock upon impact, heat generated from deformation of a malleable nose cap and the forward motion of an anvil upon deceleration of the projectile, substantially simultaneously to initiate combustion of the fuze.

A still further object of the invention is to provide a fuze in which an igniter compound of greater sensitivity may be substituted whereby ignition is effected by the combined forces of shock upon impact and the forward motion of an anvil upon deceleration of the projectile.

A still further object of the invention is to provide a fuze which is simple in construction, cheap to manufacture and which has no springs, firing pin, or centrifugally operated elements.

Other objects and advantages will be apparent from the following detailed description and the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view of the forward portion of an explosive projectile and a fuze embodying one form of the present invention;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1, illustrating the construction of the front end of the anvil.

The present invention was devised to provide a fuze which will operate without the use of a conventional firing pin or striker element, and in which a primer element is positioned in the nose portion in reversed position to usual practice. Because of this location of the primer and the protection afforded by the nose portion, the fuze is very insensitive to shock and rough handling insufficient to crush the nose portion. The anvil being of very small mass, will not initiate the primer on slight impact, such as would occur in rough handling but, on impact at high velocity due to relatively great kinetic energy increasing with the square of velocity

$$\text{k.e.} = \tfrac{1}{2}mv^2$$

the anvil assists or is the principal factor in initiating the primer. The result is safety in handling, but certainty of operation on impact.

When in use against targets of light outer construction the igniter compound in the primer is insensitive to first impact but, on impact against a firmer object inside the target, detonation will occur.

In this instance the functions of ignition are almost simultaneous upon impact, the malleable nose portion is crushed, providing heat and the resultant shock to the primer igniter compound upon deceleration of the projectile. Forward inertia remaining in the anvil is also added to this force to insure ignition of the primer compound.

In the event that the fuze is to be used against any target sufficient to decelerate the projectile slightly, a more sensitive igniter compound will be used. The loss in kinetic energy is partially converted to shock and vibrational energy and the energy available from the deceleration of the primer anvil which is in contact with the primer compound is also added to this force to initiate the primer.

Under no circumstances can the primer compound be of such sensitivity that ignition will occur in handling or under set-back forces in the gun.

Referring now to the accompanying drawings, the numeral 5 identifies a high velocity projectile having a main explosive charge 6 and a screw threaded forward opening 7.

Fitted in the opening 7, by similar matching screw threads 8 is a fuze casing 9 having a forwardly projecting nose portion 10. The fuze casing and nose portion are formed of a malleable material so that the nose portion will be deformed on impact with a target. The nose portion is further formed with a cavity 11 in its forward end to assist deformation thereof.

Rearwardly of the cavity 11 a second cavity 12, of slightly enlarged diameter is formed to receive a primer assembly 13. The primer assembly comprises a cup 14 positioned in the cavity 12 with its closed end forward and its open end seated on a disk 15 carried in the forward end of a third cavity 16. Communication between the cavities 12 and 16 is provided by a central aperture 17 in the disk 15. In the forward closed end of the cup 14 is an igniter charge 18 over which is placed the usual paper cover 19. An anvil 20 is included in the primer assembly and is free to slide forwardly in the cup 14 on impact with a target. The anvil is positioned in the cup 14 with its rear end abutting the disk 15 and its forward diametrically reduced end 21 in contact with the paper cover 19 of the igniter charge 18. Circumferentially spaced cut outs 22 in the side walls of the anvil 20 conduct fire from the igniter charge 18 to the aperture 17 in the disk 15, and thence to a detonating or booster charge 23 in the third cavity 16 formed in the rear portion of the fuze casing.

The operation of the fuze as hereinbefore fully set forth, involves a structure which is positively operated upon high velocity impact without resorting to the use of a spring pressed striker, therefore further discussion is thought unnecessary.

While I have disclosed a form of the invention presently preferred by me, various changes and modifications will occur to those skilled in the art after a study of the present disclosure. Hence the disclosure is to be taken in an illustrative rather than a limiting sense; and it is my desire and intention to reserve all modifications falling within the scope of the subjoined claims.

Having now fully disclosed the invention what I claim and desire to secure by Letters Patent is:

In an impact detonated fuze for a high velocity projectile having an internally threaded axially disposed opening, a fuze defining a body provided with a forwardly projecting malleable nose portion and a reduced, externally threaded rearwardly projecting portion for threadable attachment in said internally threaded opening in said projectile, there being a first axial bore forming a cavity closed at its forward end in the forward portion of said fuze, a second coaxial bore having a

larger diameter than said first bore and disposed rearwardly therefrom, and a third coaxial bore having a larger diameter than said second bore and disposed rearwardly therefrom, a percussion type primer in said second bore, said primer comprising a cup, opening at its rearward end, an igniter charge in its forward end and a cover adapted to cover the rearward end of said igniter charge, an anvil having a small mass defining a diametrically reduced forward portion mounted for axial movement in said cup and disposed rearwardly of said cover, said reduced portion normally abutting said cover, there being circumferentially spaced fire passageways in the side walls of said anvil, a disc having an axial aperture disposed in the forward end of said third bore, said disc adapted to limit rearward movement of said anvil, and a booster charge in said third bore, said anvil being

adapted to be moved forwardly in said cup upon impact on said malleable nose whereupon the combined effect of heat generated by crushing of said nose and shock of projectile deceleration combines with forward inertia remaining in said anvil for detonating said igniter charge, whereby resulting fire from said igniter charge detonation will pass through said passageways in said anvil and said aperture in said disc and detonate said booster charge.

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