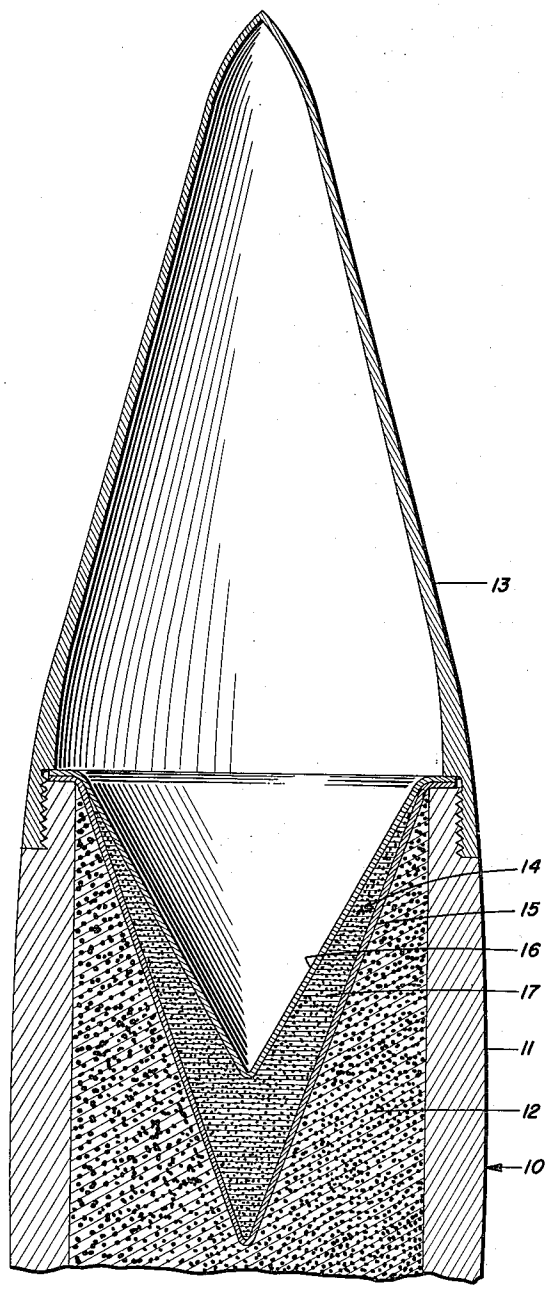
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SHAPED CHARGE PROJECTILE

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SHAPED CHARGE PROJECTILE

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1 Claim. (Cl. 102—56)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates generally to explosive charges particularly as employed in projectiles, and more specifically to shaped charges.

In the projectile explosive charge art it has been found that the armor piercing ability of a given quantity of explosive charge may be optimized by forming the forward portion of the charge with an appropriate configuration. Such charges are generally referred to as shaped charges, and their armor piercing effectiveness results from providing that shape in the front of the charge which affords the greatest directivity and concentration of explosive force in a localized area. A particularly effective configuration for such shaped charges is that obtained by forming a conical hollow or recess in the forward end of the charge. In accordance with the present invention, it is contemplated to improve the pentrating effectiveness of shaped charges by complementing the shaped charge with a pocket of chemical reactants, which when ignited by the explosion or heat of explosion of the charge produce a vigorous, very high temperature, exothermic reaction and provide a substantial quantity of molten metallic mass in the core of the gaseous products of charge detonation, thus adding to the heat and energy of the detonation and at the same time enhancing the penetrating properties of the explosive.

It is therefore one object of the present invention to complement a shaped charge with chemically interreactive materials, which when set off by charge detonation increases the energy content of the explosion.

Another object of the present invention is to complement a shaped charge with exothermically interreactive materials, which when set off by charge detonation enhances the core of the gaseous products of detonation with a molten mass of metal.

Another object of the present invention is to complement a shaped charge with exothermically interreactive materials, such as thermite or a mixture of iron oxide, potassium perchlorate, and metallic titanium, which, when set off by charge detonation, increases the energy content of the explosion and enhances the core of the gaseous products of shaped charge detonation with a molten mass of metal.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing, which is a longitudinal sectional view of the forward portion of a projectile showing the shaped charge, the pocket of reactants complementary thereto, and a ballistic nose or cap for the projectile.

The projectile 10, whose forward portion is shown in the drawing, comprises as conventional components the substantially cylindrical main casing 11, capped by the ballistic nose 13, and containing the shaped explosive charge 12. Other conventional projectile components (not shown) may of course be included in or on the projectile as deemed appropriate or desirable, as for example a detonator and/or a primer, an arming fuse, a turning band, and the like. As will be noted, the shaped charge chosen for the purpose of illustrating the present invention is the type wherein a conical recess is formed in the forward portion of the charge, which is referred to above as an effective armor piercing configuration.

In addition to the foregoing conventional components of a shaped charge projectile, there is provided in accordance with the present invention a capsule or pocket 14 containing a composition 17 of exothermically interreactive materials producing, when ignited or set off by the detonation or heat of detonation of the charge 12, a high temperature and a mass of molten metal. Composition 17 may be, for example, thermite (iron oxide and aluminum), or a mixture containing iron oxide, potassium perchlorate, and metallic titanium. In order to fix the location of the composition 17 and to facilitate its positioning in the forward portion of the charge 12, a container, pocket, or capsule is formed therefor, as for example by the nested cones 15 and 16, which preferably is formed of aluminum. It will be noted that in the preferred and illustrated embodiment the use of nested cones to form the pocket 14 provides a configuration which substantially coincides with the desired conical configuration of the forward end of the shaped charge.

In use of the present invention hereinabove described in detail with reference to one specific embodiment, upon detonation of the shaped charge 12, the heat generated ignites the composition 17 of thermite or the like, which through its own reaction generates substantial quantities of heat and provides very high temperatures. As a result of this reaction, the energy content of the explosion is elevated and there is produced a substantial quantity of high temperature molten metal mass resulting from disintegration of the metallic cones 15 and 16 plus the products of combustion of composition 17. This combined molten metallic mass is focused by the configuration of the shaped charge onto the core of the gaseous products of the shaped charge detonation such that the penetrating power of the core is exhanced.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed is:

In an explosive projectile, the combination of a casing having a nose detachably secured thereto, a portion of said casing and nose forming a circumferential groove, a shaped charge having a cone shaped recess in the forward end thereof with the wall defining said recess converging in a rearwardly direction, said charge being disposed and confined within said casing and capable of producing a jet having a potent and concentrated striking force when fired, a sealed cone shaped capsule disposed within said recess and having inner and outer mutually spaced walls diverging in a rearwardly direction, a flange on each of said walls at the base of said cone shaped capsule in snug engagement with respect to each other and disposed within said groove and in snug

engagement with said casing and nose for locking said capsule to said casing and maintaining the capsule within said recess, a chemically interreactive metallic material sealed within said capsule contiguous with said shaped charge and activated thereby and concurrently therewith for producing a mass of molten metal, the heavier molecules of which intermingle with said jet sufficiently to form an integral part thereof at the leading end of the jet thereby to increase the striking force of the jet.

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