United States Statutory Invention Registration

Vigil et al.

[54] LINEAR SHAPED CHARGE


[73] Assignee: The United States of America as represented by the Secretary of the Army, Washington, D.C.

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Related U.S. Application Data


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[57] ABSTRACT

A lightweight linear shaped charge for explosive cutting and penetration of a target, which includes a plastic linear housing in the form of a concave channel with an inverted "V" shaped metallic liner mounted within the concave channel. An explosive charge is shaped and held between the plastic housing and the metallic liner. Upon detonation of the explosive charge an explosive jet of the metallic liner is generated to cut and penetrate the target. Also, the plastic linear housing may be extended downward a short standoff distance of approximately 0.5 to 1 inch for optimum cutting and penetration of the target.

3 Claims, 1 Drawing Sheet

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LINEAR SHAPED CHARGE

This application is a continuation of application Ser. No. 07/931,466, filed Aug. 20, 1992, now abandoned.

GOVERNMENTAL INTEREST

The invention described herein may be manufactured, used, and licensed by or for the Government for Governmental purposes without payment to us of any royalties thereon.

BACKGROUND OF THE INVENTION

The invention relates to a lightweight linear shaped charge used for explosive cutting of a target. The invention uses a lightweight plastic housing enclosing a metallic inverted "V" shaped liner, with an explosive charge between the plastic housing and the metallic liner.

DESCRIPTION OF THE PRIOR ART

Current commercial linear shaped charges used for explosive cutting are manufactured by squeezing an explosive filled metal tube or pipe into a "V" shaped configuration. The resultant shaped charge is heavier in weight than it needs to be for achievement of target cutting performance, because of the heavy total metal encasement. Only the bottom "V" shaped portion of the metal case, between the explosive and the target, is effectively used in the cutting process. The upper portion of the metal case does add confinement to the explosive, which aids somewhat in the cutting performance, but this can be done by increasing the amount of explosive with a much lower weight of the shaped charge. The upper portion of the metal case also creates hot metal fragments which could pose hazards to personnel near the charge when it is fired. For most commercial applications, the unnecessary added weight and the hot metal fragments are not a concern. However, certain military applications, such as special operations force demolition missions, require that the shaped charge weight be minimized to enable manportability and the ability to parachute with the shaped charge. Also some military breaching operations, such as building entry, will require personnel to be in proximity to the charge when it is fired and the hot metal fragments must be minimized. The military needs for lightweight, low fragmentation linear shaped charges have been identified in the last few years. None of the commercial linear shaped charges can meet the military's performance requirements.

SUMMARY OF THE INVENTION

The invention solves the above problems by replacing the heavy metal upper case with a lightweight plastic housing which encloses a metallic inverted "V" shaped liner, with an explosive charge between the plastic housing and the metallic liner. In addition the metallic liner is optimized in terms of metal thickness and angles for maximum cutting performance. Also, the invention provides integral extensions from the plastic housing to make a standoff separation of the metallic liner from the target to ensure optimum metal jet formation and best performance.

The novel features of the invention, as well as the invention itself, both as to organization and operation, will best be understood from the accompanying draw-
limitations are intended in limitation thereof other than as defined in the appended claims.

We claim:

1. A lightweight linear shaped charge for explosive cutting and penetration of a target, which comprises:
   a plastic linear housing having a flat top connected along its length to two opposing arms to form a hollow concave channel therebetween with the concavity opening downward toward the target for cutting and penetration:
   a metallic liner, having an inverted “V” shape, mounted within the concave opening and attached along the interior length of each opposing arm, with the top of said inverted “V” shape extending lengthwise along the interior of said linear housing beneath said flat top and above the target, so as to form a hollow interior space between said metallic liner and said plastic housing;
   an explosive charge shaped and held within said hollow interior space between said metallic liner and said plastic housing; and
   a detonator holder connected to said plastic housing and holding a detonator therein for initiation of said explosive charge to make an explosive jet of said metallic liner for cutting and penetration of the target.

2. The lightweight linear shaped charge of claim 1, wherein each of said opposing arms are integrally extended a short distance outward and downward toward the target.

3. The lightweight linear shaped charge of claim 2, wherein the the extension of each of said opposing arms is for a distance of approximately 0.5 to 1 inch.

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