United States Patent

[11] **3,613,585**

[72] Inventor **Stanley Dubroff**
Philadelphia, Pa.

[21] Appl. No. **769,515**
[22] Filed **Oct. 24, 1958**
[45] Patented **Oct. 19, 1971**

[73] Assignee **The United States of America as represented by the Army**

[54] **HIGH EXPLOSIVE ANTITANK SHELL**
4 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **102/52,** 102/56
[51] **Int. Cl.** **F42b 13/04,** F42b 13/10, F42b 15/26
[50] **Field of Search** ..... 102/56, 56 HC, 6, 87, 90, 52

[56] **References Cited**

UNITED STATES PATENTS

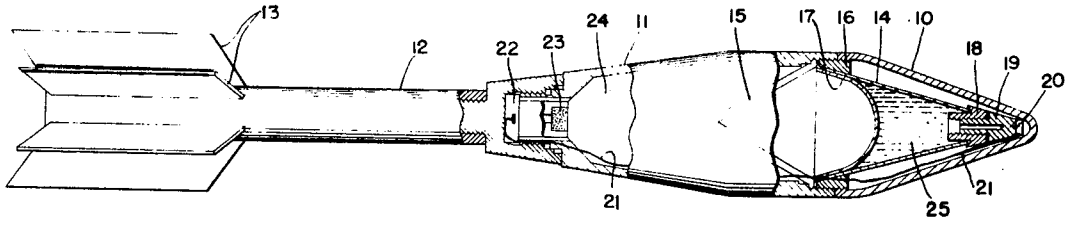
1,858,456	5/1932	Mills	102/6 X
2,787,958	4/1957	Brandt	102/56 X

FOREIGN PATENTS

415,674	8/1934	Great Britain	102/87
1,002,092	10/1951	France	102/24 HC
131,701	3/1949	Australia	102/56

Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—C. T. Jordan
Attorneys—S. J. Rotondi, Jr., A. T. Du Pont and H. R. Johns

CLAIM: 1. In a projectile of the hollow charge type wherein a jet of metal is formed by the detonation of an explosive material in response to the impact of said projectile, said projectile having a body, an ogive forward of said body, said ogive being hollow; the combination therewith of the improvement whereby the behind the barrier effectiveness of the projectile is increased, said improvement comprising: a container mounted within said ogive, said container being imperforate and enclosing an inflammable material, said inflammable material being distributed substantially uniformly and continuously in both longitudinal and transverse directions such that there is always a mass of said inflammable material along the axis of said projectile, whereby, upon detonation of said projectile the jet formed thereby, traveling along the axis of said projectile, passes through said inflammable material carrying a substantial part of said inflammable material through and behind a target barrier.



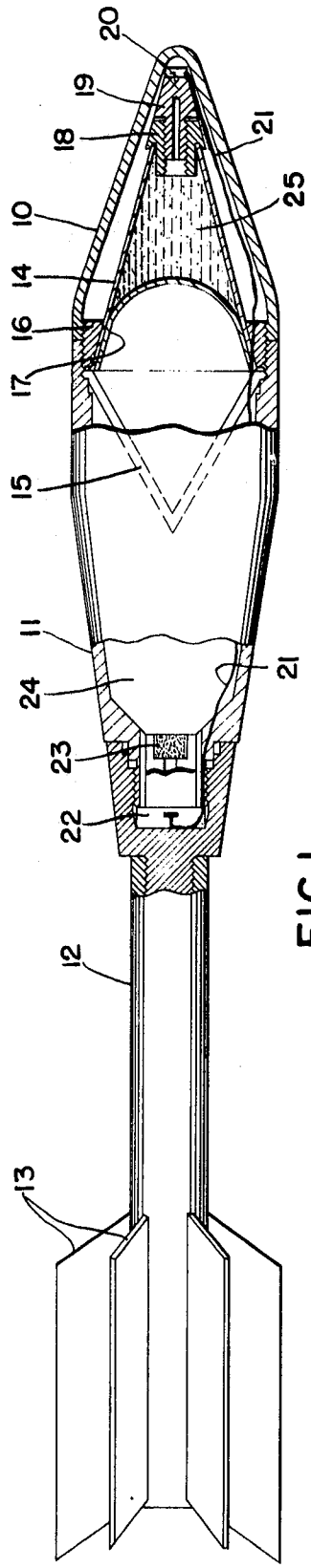


FIG.1.

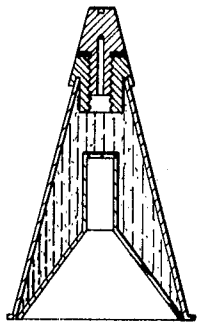


FIG.2.

INVENTOR.
STANLEY DUBROFF
BY S. J. Rotondi,
A. T. Dupont & H. R. Johns
ATTORNEYS:

HIGH EXPLOSIVE ANTITANK SHELL

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 projectiles adapted to use the hollow or shaped charge principle to perforate enemy emplacements having armor plate, concrete or the like arranged in such a manner as to protect the personnel or equipment contained therein.

At the present time, and for a long and continuous time in the past, since the conception of the hollow charge, and its effect, known as the Meznay-Chardin effect, there has been much discussion about the effectiveness of the shaped or hollow charge against the above-described targets. As such there have been various attempts to increase the effect of the hollow charge once it has perforated the protective barrier. This invention greatly increases the effect of the hollow charge, to the extent that there can no longer be any doubt of this effect against personnel or material depending upon the chemical agent used.

Generally, High-Explosive Antitank projectiles include a forward or nose portion abutting at its rear end a conical member known as a hollow charge. To the rear of this conical member is an explosive charge which is fired in response to impact of the projectile on a target. The firing of this charge converts the conical member into a jet which is projected through the nose portion or ogive of the projectile into and through the target.

The present invention increases the destructive effect behind the protective barrier of a High-Explosive Antitank projectile by incorporating in the forward portion a container enclosing a filler such as white phosphorus, napalme, gasoline or the like. Under these conditions, the jet from he hollow charge penetrates the container **14** and the filler **25**, and the protective barrier, and the inflammable material follows the jet and spreads into the penetrated area thus increasing by many fold the ultimate effectiveness of the projectile.

The invention will be better understood from the following description when considered in connection with the accompanying drawing and its scope is indicated by the appended claims.

REFERRING TO THE DRAWING

FIG. **1** illustrates a fin stabilized high-explosive antitank projectile wherein the invention has been embodied, and

FIG. **2** illustrates a modified form of container for the inflammable material.

The projectile of FIG. **1** includes an outer ogive **10**, a body **11**, a boom **12**, and stabilizing fins **13**. These parts are wall known to those skilled in the art and need not be considered in detail. The present invention appertains more particularly to what is enclosed within the ogive **10**.

It can be seen in FIG. **1** that the ogive **10** encloses a container **14** which is located forward of the conical member **15** made of steel, copper or the like. The container **14** is clamped against the cone **15** by a collar **16** which is threaded into the front end of the body **11** and into the back end of the ogive **10**. The container **14** is recessed at its rear end as indicated at **17** to allow room for the jet to form and at its front end is brazed to a member **18** into which is threaded a member **19**. Between the members **18** and **19** there is a gasket made of a material which is compatible with the filler **25**.

In the nose of the ogive **10** and ahead of the member **19** is a piezoelectric fuse **20** which may be similar to that disclosed in

a copending application of Thomas deW. Dowdell and C. Walton Musser, Ser. No. 727,501 (ORDBA-418), filed Apr. 9, 1958, for "Piezoelectric Fuse."

The fuse **20** is connected through means, shown as a lead wire **21**, to a base element **22** which contains an ignition charge **23**. Firing of this charge ignites a main charge enclosed within a chamber **24**.

Thus assuming the projectile to have struck a target, the piezoelectric fuse **20** is compressed and transmits an electronical impulse to the base element **22**. This fires a primer within the base element which in turn fires the ignition charge **23** and the main charge in the chamber **24**. Firing of the main charge converts the conical member **15** into a jet of metal which is driven through the container **14** and out of the projectile into the adjacent area. Carried along with this jet and following it is the highly inflammable contents of the container which adds very materially to the destructiveness of the projectile.

As mentioned above, the container **14** has a spherical recess **17** at its back end. This is for the purpose of allowing space for the better formation of the metallic jet. It is sometimes desirable to modify this recess as indicated by FIG. **2** so that the jet path includes a shorter stretch of inflammable material to ensure that the jet will penetrate the protective barrier. While the invention has been shown as applied to a fin stabilized high-explosive antitank projectile, it is to be understood that its utility is not restricted thereto.

I claim:

1. In a projectile of the hollow charge type wherein a jet of metal is formed by the detonation of an explosive material in response to the impact of said projectile, said projectile having a body, an ogive forward of said body, said ogive being hollow; the combination therewith of the improvement whereby the behind the barrier effectiveness of the projectile is increased, said improvement comprising: a container mounted within said ogive, said container being imperforate and enclosing an inflammable material, said inflammable material being distributed substantially uniformly and continuously in both longitudinal and transverse directions such that there is always a mass of said inflammable material along the axis of said projectile, whereby, upon detonation of said projectile the jet formed thereby, traveling along the axis of said projectile, passes through said inflammable material carrying a substantial part of said inflammable material through and behind a target barrier.

2. In a projectile as in claim **1**, said container having a recess at its rear end, whereby the formation of said jet is facilitated.

3. In a projectile of the hollow charge type wherein a jet of metal is formed by the detonation of an explosive material in response to the impact of said projectile, said projectile having a body, an ogive forward of said body, said ogive being hollow; the combination therewith of the improvement whereby the behind the barrier effectiveness of the projectile is increased, said improvement comprising:

a container mounted within said ogive, said container being imperforate and enclosing white phosphorous, said white phosphorous being distributed substantially uniformly and continuously in both longitudinal and transverse directions such that there is always a mass of said white phosphorous along the axis of said projectile, whereby, upon detonation of said projectile the jet formed thereby, traveling along the axis of said projectile, passes through said white phosphorous carrying a substantial part of said white phosphorous through and behind a target barrier.

4. In a projectile as in claim **3**, said container having a recess at its rear end, whereby the formation of said jet is facilitated.