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J. C. GRAY ET AL

2,426,997

PROJECTILE

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Fig. 1.

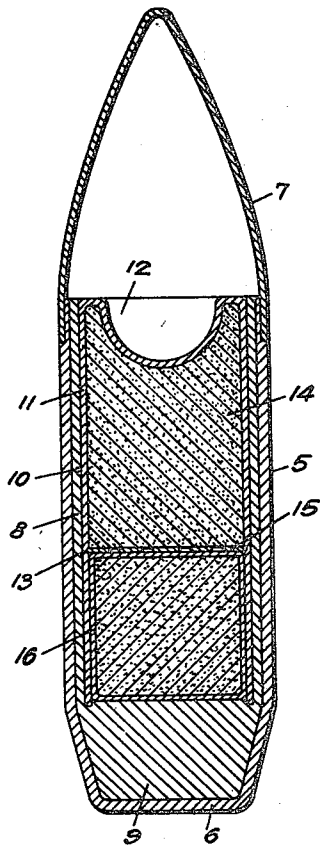


Fig. 2.

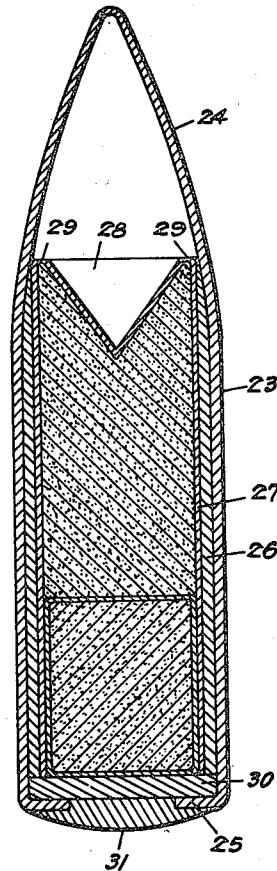
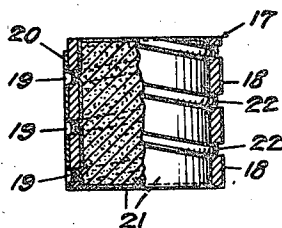


Fig. 3.



Inventors

John C. Gray

Wilfred E. Thibodeau

Joseph H. Church

Gregory J. Kessenich

By *G. J. Kessenich & J. H. Church*
Attorneys

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PROJECTILE

John C. Gray, Arlington, Va., Wilfred E. Thibodeau, Cleveland, Ohio, Joseph H. Church, Austin, Minn., and Gregory J. Kessenich, Madison, Wis.

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5 Claims. (Cl. 102—56)

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

This invention relates to a projectile.

Since the disclosure in German Patent No. 12,119 of 1881 of the principle of obtaining an increased penetrating effect by coning or recessing the face of a detonating charge, there has been considerable discussion of the theory involved and the proposed structure has been generally adapted for use in blasting caps. In British Patent No. 28,030 of 1911 it has been proposed to employ the coned face in the explosive charge of a projectile fired from a gun.

The purpose of this invention is to employ the principle of the coned or recessed face in such a manner as will facilitate fabrication of the projectile and insure its effective functioning. This is accomplished by employing a capsule of the blasting cap type and associating it with a base fuse of the nitroglycerin-absorbent type.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a longitudinal sectional view of the improved projectile.

Fig. 2 is a similar view of a modification thereof.

Fig. 3 is a longitudinal sectional view of an alternate form of casing for the fuse.

Referring to the drawings by characters of reference and more particularly to Fig. 1, there is shown a projectile which may be of any desired caliber but which in the illustration conforms to the general structure of a small arms bullet. The projectile comprises a jacket 5 having a closed base 6 and an open front end on which is placed a cap 7. A core 8, preferably of lead, having a closed base 9 and an open front end is inserted in the jacket and has its front end spaced from the nose of the cap 7.

The open end of the core is formed with a bore 10 for receiving a main capsule 11 which for the sake of facility of production and availability is of the type constituting the casing of a conventional blasting cap as disclosed, for instance, in U. S. Patent No. 1,462,074 and British Patent 172,914 of 1921. The capsule includes the usual recessed front face 12 which according to this invention is spaced from the nose of the cap 7. It is provided intermediate its length with an in-

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ternal rib, or stop shoulder or groove 13 which may be conveniently formed in the capsule.

An explosive charge 14 disposed in the capsule between the front face 12 and the groove 13 may be loaded under sufficient pressure to insure its form and prevent it from moving rearwardly on set-back and this may be supplemented by a thin apertured plate 15 forced into the groove 13.

In rear of the explosive charge there is disposed a fuse which may comprise an auxiliary capsule 16 containing nitroglycerin and an absorbent. The absorbent may consist of kieselguhr, as is well understood in the art, or it may be an explosive material such as trinitrotoluol, or it may be of a material such as metallic powder as described in U. S. Patent No. 93,754 of 1869. The fuse functions in a known manner, the nitroglycerin separating out from the absorbent under the influence of centrifugal force after the projectile leaves the gun and becoming sensitive to the slightest shock.

The fuse may be of the type described in the pending application of J. H. Church and G. J. Kessenich, Serial No. 314,624, filed January 19, 1940, or it may be as shown in Fig. 3 wherein the casing 17 is formed to include spaced helical convolutions 18. The casing 17 may be in the form of a spring or it may be of a relatively non-resilient material such as copper. The spiral convolutions of the casing may be held against rearward movement on set-back by means of resilient detents 19 formed on a cage 20 and movable outwardly under the influence of centrifugal force to release the same, or the bag or container 21 may be packed with the absorbent and nitroglycerin in such a manner that it will bulge into the spaces between the convolutions. Either one or both methods may be used. The purpose of this arrangement is to provide for a pinching action as the coil contracts on impact. When the container 21 is of metal the bulge will be in the form of a convexity forming a hollow thread 22 which will facilitate manufacture and assembly.

In the form shown in Fig. 2 the jacket 23 has an integral ogival nose 24 and its rear portion is adapted to be subsequently turned inwardly in a known manner to provide a partially open base 25. A core 26 in the jacket receives a capsule 27 which has a conically recessed front face 28 connected to the body by a weakened edge 29. The core and capsule are supported by a plug 30 which is retained by the base 25. The open base is closed by a plug 31 of a known type.

Other shapes for the recessed face 28 will

readily suggest themselves. In particular, there may be used any of the modifications shown in the article by Neumann, "Neuartige hohlkörper aus Brisanzstoffen," Zeitschrift für das Gesamte Schiess- und Sprengstoffwesen, May 15, 1914, pp. 183-187.

In operation, the fuse is processed in flight, the nitroglycerin being separated from the absorbent under the influence of centrifugal force and thereby placed in condition to be set off at the slightest shock. The nitroglycerin sets off the explosive charge 14 in a manner similar to that of a blasting cap or the detonators of U. S. Patents 1,534,011 and 1,810,000. The action of the explosive charge and its coned front face has been often described in the literature on shock waves and pressure waves, instances being U. S. Senate Doc. No. 20 of 1893 and Proceedings of the Royal Society (London) A, vol. 148, pp. 604-622. Photographs of blasting show that the recessed face of the capsule is projected forwardly at a high velocity which of course would be increased by the velocity of a projectile when incorporated therein and fired therewith.

We claim:

1. A projectile comprising a body portion with a closed base and a generally cup-shaped jacket surrounding the base and sides of said body portion, a bore in the forward face of said body portion and coaxial therewith, a hollow windshield seated on the forward portion of said jacket and constituting the ogive of the projectile, a cylindrical container fitted in said bore and having a closed end with a central recess, said end being spaced from the point of said hollow windshield, an explosive charge in said container and an initiating charge rearward of said explosive charge.

2. A projectile comprising an outer jacket including an ogival portion, a soft metal tubular liner within said jacket rearward of said ogival portion, a soft metal plate rearward of the liner, turned ends of the jacket retaining the plate and defining a central opening, means for closing the opening, a cylindrical metal container fitted in said liner and having a closed end adjacent the forward end of said liner, a central inward recess in said closed end, an explosive charge in said container and an initiating charge rearward of said explosive charge.

3. A projectile having a hollow interior including the nose portion, a capsule fitted in said

projectile rearwardly of the nose portion, said capsule having a closed end in the direction of the nose portion of the projectile, a recess in said closed end, an explosive charge in the capsule in the portion adjacent the closed end, and an initiating unit rearward of said charge comprising an outer member of spaced helical convolutions and an initiating charge of nitroglycerin mixed with an absorbent within said outer member and extending into the spaces between convolutions.

4. In a projectile as in claim 3, a separate container for the initiating charge having convexities threaded into the said spaces between the convolutions.

5. A projectile as in claim 3 in which said initiating charge is contained within a separate container of limp material.

JOHN C. GRAY.

WILFRED E. THIBODEAU.

JOSEPH H. CHURCH.

GREGORY J. KESSENICH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 11,517	Justin	Dec. 10, 1895
1,366,555	Brayton	Jan. 25, 1921
1,380,773	Clay	June 7, 1921
1,903,348	Anderson	Apr. 4, 1933
124,397	Volney	Mar. 5, 1872
2,269,475	Pomeroy	Jan. 13, 1942
35 399,877	Graydon	Mar. 19, 1889
93,754	Shaffner	Aug. 17, 1869

FOREIGN PATENTS

Number	Country	Date
40 504,857	France	Apr. 24, 1920
28,030	Great Britain	Dec. 13, 1911
9,320	Great Britain	June 25, 1915
14,827	Great Britain	July 3, 1903
45 426,982	Germany	Mar. 22, 1926

OTHER REFERENCES

Royal Society, Series A, vol. 148, Jan.-Feb., 1935, pp. 604-622.

Popular Science, vol. 28, p. 138, 1886.

50 Neuman, "Notes on Hollow Charges." (Same as Zeitschrift, below.)

Zeitschrift, etc., T. P. 270 A 125.