Sept. 10, 1940. W. H. WOODFORD ET AL 2,214,359

AMMUNITION

Filed May 20, 1937

Fig. 1

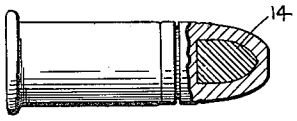


Fig. 4

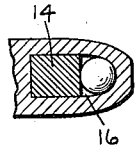


Fig. 2

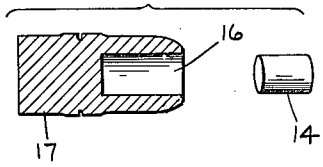


Fig. 3

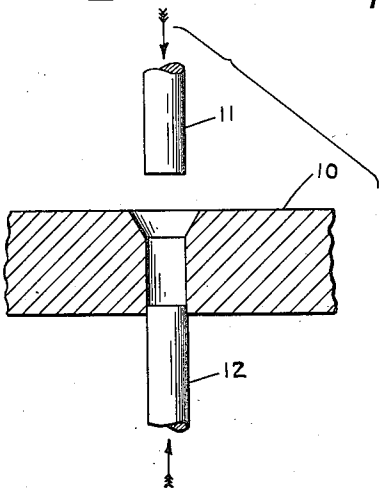


Fig. 6

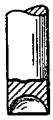


Fig. 5



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UNITED STATES PATENT OFFICE

2,214,359

AMMUNITION

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Application May 20, 1937, Serial No. 143,702

1 Claim. (Cl. 102—26)

This invention relates to ammunition, and particularly to an improved projectile designed to indicate the point of impact with a target by means of a flash of light induced by such impact.

The invention is particularly adapted, although not necessarily limited, to exhibition and gallery shooting where a flash of light indicating the impact of a projectile with a target is desirable.

In the drawing:

Fig. 1 is a view of a cartridge embodying the present invention, the bullet thereof being sectioned to show the illuminating composition.

Fig. 2 is an assembly view of a bullet or projectile having a hollow point adapted to receive a pellet of an illuminating composition.

Fig. 3 is a sectional view of a die used in the preparation of the pellet.

Fig. 4 is a fragmentary, sectional, side elevation of a projectile embodying the invention in a modified form.

Fig. 5 is a side elevation of an illuminating pellet including a modification of the invention.

Fig. 6 is an elevation of a pellet forming punch suitable for use in the production of pellets as illustrated in Fig. 5.

Prior efforts along the lines of indicating the impact of projectiles have included placing in a hollow in the nose of the projectile a powdered composition including a combustible material, an oxidizer, and an explosive substance for initiating combustion. The presence of an explosive is undesirable, and the presence of a loosely compacted powdered material is undesirable both on account of the dangers of premature combustion or explosion in handling and the spread of incendiary materials upon impact.

The present invention contemplates both a novel illuminating composition and a novel method of preparing the composition in such a manner as to render the loaded cartridges entirely safe to handle and to eliminate fire hazards upon impact while securing by impact an intense white light. It has been found that certain metallic alloys are especially desirable illuminating compositions, particularly when properly admixed with suitable oxidizers, and that compositions of this character can be produced in a form which is entirely stable in the presence of moisture, safe to handle, not liable to combustion under blows of considerable magnitude, and yet burns with a white flame of low temperature under the force of the impact of the projectile with a hard target. One such alloy consists essentially of aluminum and manganese. The preferred proportions are about 60% aluminum and 40% manganese, but these proportions are subject to substantial variations. This alloy is extraordinary in that both manganese and aluminum, particularly in powdered form, are readily susceptible to oxidation in a humid atmosphere, yet the alloy of the two in powdered form has been found to be substantially immune to oxidation and attack by moisture. Samples of powdered aluminum and powdered manganese have been practically destroyed by exposure to a humid atmosphere, where samples of the powdered alloy of the two under identical conditions have sustained no attack or decomposition.

For the preparation of an illuminating composition, such an alloy is pulverized, preferably to such a granulation as to pass a 100 mesh screen and to remain on a 200 mesh screen, and may be mixed with a suitable oxidizer of similar granulation. A very desirable oxidizer is basic lead nitrate. The oxidizer may be present in amounts varying from 30% to 70%. The composition is further prepared for use by compressing portions thereof into pellets. An intimate mixture of equal parts by weight of a pulverized alloy and an oxidizer of about equal granulations can be formed into pellets of unusual rigidity and durability. For this purpose, measured portions of the illuminating composition are introduced into a die and compressed to a predetermined volume. Preferably the die is provided with oppositely moving reciprocating plungers, it having been found that more coherent pellets can be produced in this manner than by the use of a die provided with one moving element only. By way of illustration, the preparation of a particular illuminant will be described. An alloy comprising 40.5% manganese and 59.5% aluminum is prepared and reduced to a granulation between 100 and 200 mesh. With the alloy is mixed an equal weight of basic lead nitrate of similar granulation. Suitable portions of the admixture are compressed in a die of the type diagrammatically illustrated in Fig. 3, wherein the body of the die is indicated by the numeral 10 and the oppositely moving compressing plungers by numerals 11 and 12, respectively. The pellet thus produced is illustrated as 14 in Fig. 2, and is strikingly dense, rigid and coherent.

The illuminating pellet thus prepared is dropped into a recess 16 in the nose of the projectile 17, and the projectile metal is thereafter swaged over the pellet in the usual bullet swaging press. Pellets may be dropped into the projectile recesses in conjunction with the movement of projectiles into position to be operated upon by

the swaging die. The projectile itself may be of any desired form and made from any desired metal. Fig. 1 illustrates a cartridge provided with a projectile made from solid lead in the usual manner; it may, if desired, be provided with a jacket of a relatively hard metal. For short range and shooting gallery purposes it is desirable to provide a projectile which substantially completely disintegrates on impact with a hard object, such for example as the projectiles described in the pending application of Woodford, Serial No. 616,024, filed June 8, 1932, the metal of these projectiles has not the tensile strength of the metal of solid projectiles, and undesirable strains might result from swaging it over the sharply defined end of a cylindrical illuminating pellet of the type shown in Fig. 2. This difficulty may be obviated by placing a spherical object, such as a lead shot, in the cavity in the projectile nose and above the illuminating pellet and thereafter swaging the projectile metal over pellet and shot in the manner illustrated in Fig. 4. The same result can be accomplished by forming the illuminating pellet with a hemispherical end as shown in Fig. 5 by suitable means such as a punch having a concave face as illustrated in Fig. 6.

The illuminating pellets heretofore described are hard, dense, rugged and stable. They are not attacked by moist air, even at elevated temperatures, cannot be ignited with a spark or the flame of a match or by a hammer blow of such force as to crush them; upon impact with a target, however, they are ignited and produce a disk of white flame. Their combustion probably facilitates disintegration of the projectile, which for shooting gallery purposes is highly desirable. The flame is of very low temperature, and evolves very little heat, readily combustible materials placed within a few inches of the point of impact not being ignited. Applicants have thus attained the object of spectacularly exhibiting the point of impact with a maximum of safety throughout the preparation of illuminant, projectile and cartridge, and the handling and firing of the cartridge.

What is claimed is:

An illuminating disintegrating projectile comprising a cavity containing a pre-compressed pellet of an illuminating composition and a spherical shot superposed on said pellet, the body material of said projectile being swaged and closed over said spherical shot.

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