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PERIPHERAL IGNITION SYSTEM

Filed June 23, 1959

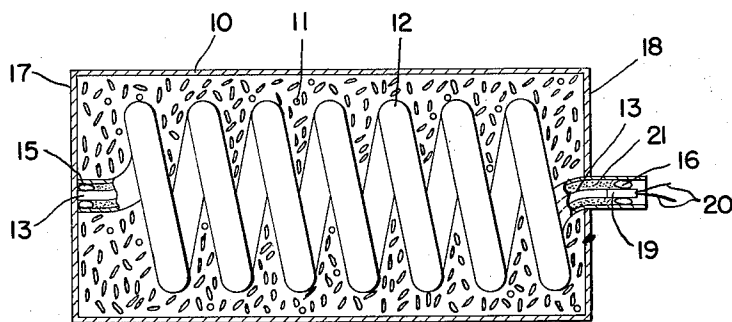


FIG. 1.

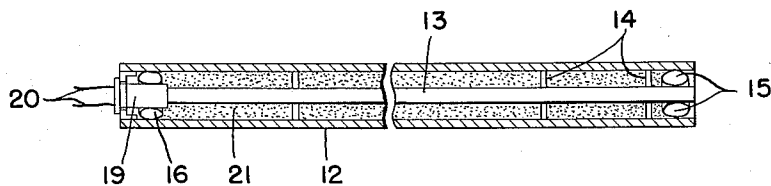


FIG. 2.

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PERIPHERAL IGNITION SYSTEM

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1 Claim. (Cl. 102-46)

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

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 ammunition, and has for its principal object the provision of an improved ignition system and method of operation whereby the propellant of the charge is more effectively utilized than heretofore.

In a previously known system of ignition, a central core of relatively fast burning powder is surrounded by a propellant which burns at a much slower rate. This prior system has the advantage that the propellant is burned more evenly because it is more quickly ignited from one of its ends to the other. It leaves something to be desired, however, with respect to the residue of unburned propellant grains which are discharged from the weapon and wasted.

This loss of unburned propellant is largely due to the fact that the central part of the propellant is first ignited and the resulting flame moves outwardly into the unburned propellant. As a result, an appreciable part of the propellant is discharged from the weapon in an unburned state.

In accordance with the present invention, a more efficient use of the propellant is effected by positioning the fast burning powder near the outer periphery of the propellant. This has the advantage that the flame originated by the fast burning powder travels toward the central axis of the propellant and the otherwise unburned propellant grains are forced outwardly into the surrounding sheet of flame where they are more completely burned.

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

Referring to the drawings:

FIG. 1 is a view, partly in section, of an explosive charge made in accordance with the present invention, and

FIG. 2 shows the construction of the tube which encloses the fast burning powder and the means for igniting this powder.

The charge depicted by FIG. 1 includes a casing 10 which encloses a relatively slow burning propellant 11. Embedded in this propellant and spaced from the inner wall of the casing 10 is a tube 12 which is in the form of a helix and may consist of lead, soft aluminum, a plastic, a fabric or the like. The tube 12 surrounds a smaller

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tube 13, is spaced therefrom by spacers 14 (see FIG. 2) and grommets 15 and 16, and is supported by the end walls 17 and 18 of the case 10. At its ignition end the tube 13 terminates in a primer 19 which may be fired by a voltage applied to it through leads 20 or in any other conventional manner.

Between the tubes 12 and 13 is a relatively fast burning black powder 21. The tube 13 contains an ignition or transfer powder which may be composed of PETN (pentaerythritol tetranitrate) and a slower burning explosive, with a resulting burning rate of about 12,000 feet per second. The helical tube 12 is positioned coaxially within the casing 10 containing the propellant 11 and is spaced from the case by a distance of about one-tenth the inside diameter of the case 10 so that the diameter of the helix is about 80% of the diameter of case 10. When loaded, the propellant 11 is positioned to cover the tube 12 completely.

When the primer 19 is fired, the flame moves along the tube 13 at a rate of about 12,000 feet per second. As the flame moves, the black powder 21 is ignited and the ignition tube 12 progressively disintegrates, igniting the propellant column 11 near its periphery. The remaining column of propellant is enclosed within a constricting cylindrical sheet of flame in which it is completely consumed. As a result, propellant scattering is minimized for the reason that the propellant grains are restricted by the wall of flame. As will be apparent to those skilled in the art, the helical distribution of the black powder igniter 21 contributes to a uniform ignition of the propellant, resulting in complete propellant combustion with consequential high-order function of the propellant charge. This, in turn, contributes greatly to smooth operation of automatic weapons, increased velocities and improved reproducibility of data.

We claim:

In a casing containing a solid propellant, an ignition tube containing black powder, a second tube imbedded in said black powder, said second tube containing an ignition powder and spaced from and parallel to, said first tube, and means for igniting said ignition powder, the combination therewith of the improvement for improving ignition of a solid propellant charge, said improvement consisting of, arranging said ignition tube inside said casing in the form of a helix, said helix having a diameter of about 80% of a diameter of said casing and the axis of said helix being coincident with an axis of said casing.

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