Sept. 28, 1965 J. E. GILES 3,208,387

SELF-LUBRICATING AMMUNITION

Filed April 4, 1963

Fig. 1

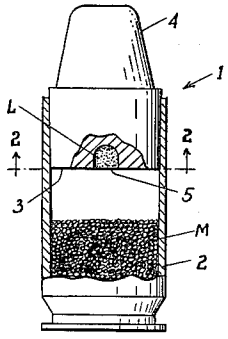
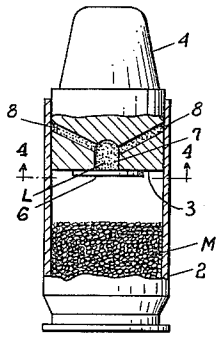



Fig. 3



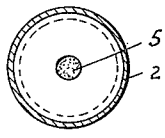




Fig. 2

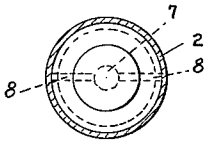
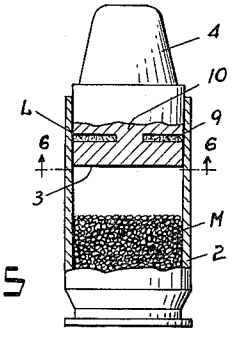



Fig. 4

Fig. 5



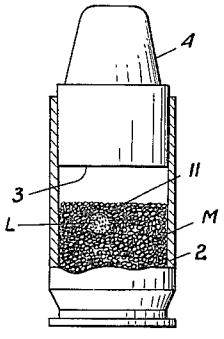




Fig. 7

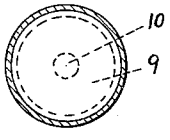



Fig. 6

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# SELF-LUBRICATING AMMUNITION

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This invention relates to ammunition for various type weapons and more particularly relates to self-lubricating projectiles and method for automatically lubricating the barrels of such weapons.

Heretofore, various arrangements have been applied for lubricating the barrel of various type weapons during normal usage thereof. In certain applications the composition of the metal or alloy constituting the cartridge shell and/or projectile has been varied to include various type lubricating ingredients or auxiliary lubricating components, such as lubricating rings or washers, that have been applied to the cartridge shell and/or projectile for purposes of lubrication. Such applications not only have the disadvantages of high cost and complexity of manufacture, but incorporate the disadvantage of metal deposition or lead fouling in the barrel of the weapon resulting in poor accuracy and a short end barrel life.

Heretofore, in other applications, lubricants have been applied directly to the external surfaces of the projectile. Such arrangements incorporate the disadvantages of the exposed lubricant becoming accidently dislodged during normal handling of the projectile or in certain applications the lubricant will "bleed" in hot weather which produces severe detrimental effects upon the explosive charge and/or the primer of the ammunition.

Therefore, the principal object of the present invention is to provide self-lubricating projectiles and method for automatically lubricating the barrel of various type weapons that will increase the accuracy and range of such ammunition.

Another object of the present invention is to provide self-lubricating projectiles of the above type which will substantially increase the accuracy and range of such ammunition by minimizing the frictional resistance and lead fouling in the barrel of conventional type weapons.

Another object of the present invention is to provide self-lubricating projectiles of the above type which incorporate a heat resistant type lubricant that will effectively lubricate the barrel of a weapon but which will not "bleed" or accumulate excessively in the working parts of the weapon, as heretofore the case with conventional wax-type lubricants.

A still further object of the present invention is to provide a self-lubricating projectile of the above type which is simple to manufacture, inexpensive to produce, and which facilitates reloading of the cartridge case by elimination of the wax-type lubricant on the periphery of the projectile.

Other objects and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a front elevational view partly in section showing the novel ammunition embodying the present invention;

FIG. 2 is a cross-sectional view taken along the plane of line 2—2 of FIG. 1;

FIG. 3 is a front elevational view partly in section showing a modified form of the novel ammunition embodying the present invention;

FIG. 4 is a cross-sectional view taken along the plane of line 4—4 of FIG. 3;

FIG. 5 is a front elevational view partly in section showing a further modified form of the novel ammunition embodying the present invention;

FIG. 6 is a cross-sectional view taken along the plane of line 6—6 of FIG. 5; and



FIG. 7 is a front elevational view partly in section showing still another modified form of the novel ammunition embodying the present invention.

In accord with the aforementioned principles and objects, the present invention, briefly described, provides a novel self-lubricating ammunition including a projectile adapted for use with a conventional type of cartridge shell. In the preferred forms illustrated herein, the projectile may be provided with reservoirs and/or passages formed therein and adapted to receive a lubricating media that is adapted to be distributed onto the interior surfaces of the barrel of a weapon for automatically lubricating the surfaces of the barrel upon discharge of the projectile from the weapon.

In another form, the lubricant may be applied directly to the explosive charge of the weapon in the form of a lubricant-containing capsule which is adapted to be disintegrated as part of the explosive charge upon firing of the weapon.

Referring again to FIGS. 1 and 2 of the drawings, there is illustrated one form of the invention wherein the ammunition designated generally at 1 includes a conventional type cartridge shell 2 of a generally tubular shape having a closed rear end and an open front end and which is adapted to receive therein an explosive charge M. The open front end of the cartridge shell 2 is of a size sufficient to receive therein the base 3 of the projectile 4, which may be attached within the open end of the cartridge shell 2 by any suitable attachment means, and/or by suitable forming operations, such that the projectile may readily be detached therefrom and propelled axially through the barrel of a weapon (not shown) upon ignition of the explosive charge M.

In accordance with the present invention, the projectile 4 may be made of any metal or alloy and may be formed to any shape or configuration, as is customary in the art. In the form illustrated, the base 3 of the projectile 4 may be provided with a concentrically disposed cavity or lubricant receiving reservoir 5 which extends axially into the body of the projectile 4. The reservoir 5 may be of any shape or configuration and of a depth sufficient to accumulate therein an amount of lubricant L sufficient to effectively lubricate the internal surfaces of the barrel of a weapon.

In a typical application of this form of the invention, the projectile 4 is detached from the cartridge shell 2 and propelled axially through the barrel of the weapon under the force of the exploding powder gases. The force from the explosive charge M presses against the base 3 of the projectile 4 and "spatters" or "blows" the accumulated lubricant L within the reservoir 5 generally radially onto the confining interior surfaces of the weapon barrel. The intense heat and pressure from the exploding powder gases act to vaporize the accumulated lubricant L which readily circulates around the projectile 4 as it is propelled at a high velocity through the barrel, thereby automatically lubricating the interior surfaces of the barrel. Moreover, upon discharge of a single round of such self-lubricating ammunition, there is disposed on the interior surfaces of the barrel sufficient deposits of lubricant to provide for repeated firings of conventional type unlubricated ammunition before frictional resistance and lead fouling again build up in the barrel to cause any noticeable firing inaccuracy.

In another modified form of the present invention, as shown in FIGS. 3 and 4 of the drawings, the base 3 of the projectile 4 may be provided with a similar concentrically disposed lubricating reservoir 7. In the embodiment illustrated, the projectile 4 is preferably provided with a pair of radially extending passages 8 which open at one end into the upper end of the aforementioned reservoir 7. The passages 8 extend upwardly and outwardly from the

reservoir 7 and open onto the outer peripheral surface of the projectile 4. The passages 8 may be of any suitable cross-sectional shape or configuration and of a cross-sectional dimension sufficient to enable predetermined amounts of lubricant L accumulated in the reservoir 7 to be exuded therefrom under the influence of the explosive charge M.

Moreover, in the modified form of the invention, the force of the exploding powder gases presses against the base 3 of the projectile 4 and against the accumulated lubricant L in the reservoir 7, causing the lubricant therein to flow upwardly through the passages 8. The intense heat and pressure from the explosive charge M causes vaporization of the lubricant which is then exuded from the passages 8 and ahead of the projectile 4 to automatically lubricate the interior surfaces of the barrel of the weapon, as aforementioned.

In the forms illustrated in FIGS. 1 to 4 of the drawings, lubricant L may readily be deposited within the respective reservoirs 5 and 7 by any suitable implement or hand tool, such as a "hypodermic-grease gun," for example. Because of the relative viscosity of the lubricant and capillary action within the reservoirs, the lubricant will be effectively retained therein during normal usage of the ammunition. In certain instances, when it is desired to retain the lubricant L separate from the explosive charge M, a closure or retaining membrane 6 comprised of a suitable frangible material, such as paper, waxed paper, or the like, and which is compatible with the explosive charge, may be provided to close off the opening to the respective lubricant receiving reservoir. In such case, the membrane 6 may readily be attached to the base 3 of the projectile 4 (FIG. 3) by means of a suitable adhesive, such as paraffin wax or the like.

In another modified form of the present invention illustrated in FIGS. 5 and 6 of the drawings, the projectile 4 is shown absent the aforementioned type of lubricant receiving reservoir, but is provided with an endless circumferentially extending lubricant receiving groove or slot 9. In the embodiment illustrated, the groove opens onto the exterior surface of the projectile 4 throughout its periphery thereof and extends radially inwardly therefrom a predetermined distance to define therewith a concentrically disposed axially extending column 10. The radial depth of the groove 10 is preferably less than the cross-sectional thickness of the body of the projectile 4, such that the column 10 constitutes a weakened area or zone of failure which readily deforms under the pressure from the explosive powder gases, thereby effectively exuding the lubricant L accumulated within the groove 9 onto the interior surfaces of the barrel of the weapon.

Moreover, in a typical application of this embodiment of the invention, pressure from the explosive charge presses against the base 3 of the projectile 4. The material of which the projectile is made being relatively soft, such as lead, the column 10 deforms as the projectile 4 is discharged axially through the barrel which causes the base 3 to be pressed against the body of the projectile, thereby automatically exuding lubricant from the groove 9 onto the interior surface of the barrel for purposes of lubrication.

In another modified form of the present invention, the lubricant may be applied directly to the explosive charge M, as best shown in FIG. 7 of the drawings. In the embodiment illustrated, it is preferred that the lubricant L be sealed within an expendable package or capsule 11 comprised of a material which is compatible with the explosive charge, such as paper, cellophane, polyethylene, polyvinyl chloride or the like, and which may be readily disintegrated and disposed along with the exploding powder gases, as a part of the charge. Moreover, the capsule 11, containing a predetermined amount of lubricant L, may readily be deposited within the cartridge shell 2 along with the explosive charge M during the customary loading or reloading of the ammunition.



In accordance with this modified form of the invention, the force of the exploding powder gases detaches the projectile 4 from the cartridge shell 2 and propels the projectile axially through the barrel causing the lubricant containing capsule 11 to disintegrate, thereby effectively distributing the lubricant L contained therein against the interior surfaces of the barrel, as aforementioned.

In the embodiments illustrated, it is preferred that the lubricating media be comprised of a temperature resistant material, such as a silicone or the like containing grease, which will provide an effective lubrication of the weapon, which will prevent lead fouling of the barrel after repeated firings, but which will not form excessive deposits in the working components of the weapon, as has heretofore been the case with conventional type ammunition.

From the foregoing description and accompanying drawings, it will be seen that the present invention provides a novel type of self lubricating projectile and method for automatically lubricating the barrel of various type weapons that effectively increases the accuracy and range of such ammunition by minimizing the resistance caused by lead fouling in the barrel. The present invention provides a self-lubricating type of projectile which may be easily and economically manufactured and/or reloaded and which has a clean and permanent type of lubricant that will not rub off or bleed, as has heretofore been the case with known types of ammunition.

In addition to such advantages, the present invention provides a novel type ammunition which incorporates a heat resistant lubricating material, such as silicone containing grease, which will not build up harmful deposits in the working components of the weapon thereby resulting in increased accuracy and prolonged life of the weapon.

The terms and expressions which have been used are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of any of the features shown or described, or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

I claim:

1. Self lubricating ammunition comprising in combination, an elongated cartridge shell having an explosive charge therein, a substantially solid projectile having a body including oppositely disposed nose and base portions, said base portion being cylindrical and said nose portion tapering forwardly from said base portion, said body being detachably connected at said base portion to said cartridge shell so as to be propelled through the barrel of a weapon upon firing thereof, said base portion having a flat rear surface extending generally perpendicular to the axis of said body, said body having a single centrally disposed cavity extending axially from said rear surface into said base portion, said cavity being relatively shallow with respect to the length of said base portion, said cavity being completely closed at one end thereof by a concave shaped end wall surface and opening at its other end onto said rear surface of said base portion, so as to be exposed to the explosive charge in said cartridge shell, the area of said cavity at said rear surface being no greater than one-fourth the area of said surface to minimize the effect of said cavity on said explosive charge, and said cavity being completely filled with a lubricant to be distributed rearwardly therefrom relative to forward movement of said projectile and against the interior surfaces of the barrel of said weapon under the expansive force from said explosive charge.

2. Self lubricating ammunition comprising in combination, an elongated cartridge shell having an explosive charge contained therein, a substantially solid projectile having a body including oppositely disposed nose and base portions, said base portion being cylindrical and said nose portion tapering forwardly from said base portion, said body being detachably connected at said base portion

to said cartridge shell so as to be propelled through the barrel of a weapon upon firing thereof, said base portion having a flat rear surface extending generally perpendicular to the axis of said body, said body having a single centrally disposed cavity extending axially from said rear surface into said base portion a distance less than one-half the length of said base portion, said cavity being completely closed at one end thereof by a concave shaped end wall surface and opening at its other end onto said rear surface of said base portion, the area of said cavity at said rear surface being no greater than one-fourth the area of said rear surface to minimize the effect of said cavity on said explosive charge, said cavity being completely filled with a lubricant, and destructable closure means attached to said base portion and covering said cavity for separating the lubricant therein from said explosive charge, whereby the firing of said weapon will disintegrate said closure means and distribute said lubricant in said cavity rearwardly therefrom relative to forward movement of said projectile and against the interior surface of the barrel of said weapon under the expansive force from said explosive charge.



3. Self-lubricating ammunition in accordance with claim 1, wherein said lubricant comprises a heat resistant material, such as silicon grease.

4. Self-lubricating ammunition in accordance with claim 2, wherein said destructible closure means includes a frangible membrane comprised of paper, which is comparable with the explosive charge, and adhesive means attaching said membrane to said base portion.

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