Nov. 8, 1966 A. J. GRANDY 3,283,719

MULTIPLE PURPOSE AMMUNITION

Filed June 3, 1965

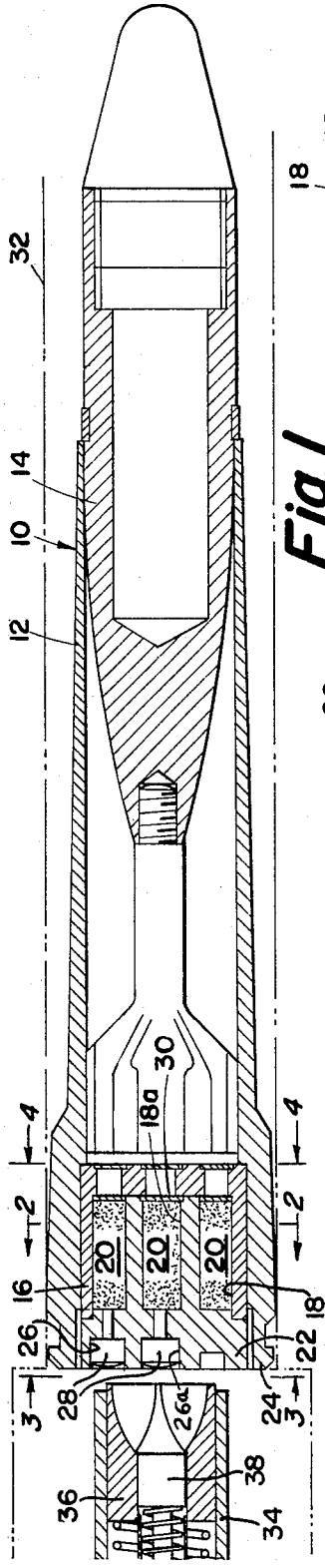


Fig. 1

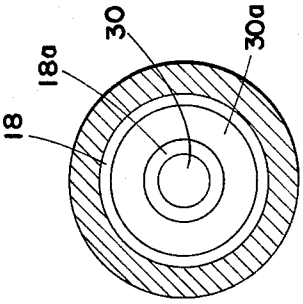


Fig. 4

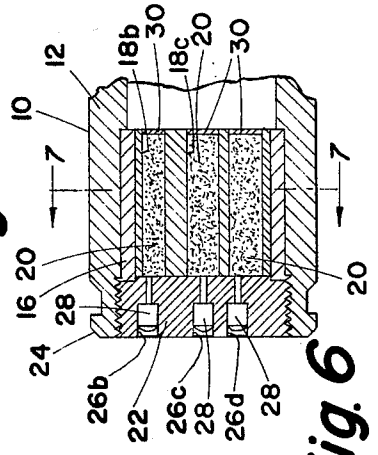


Fig. 6

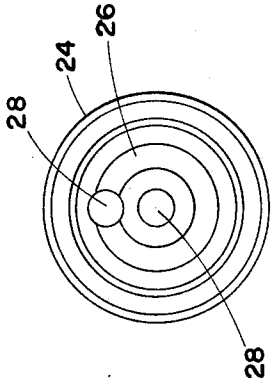


Fig. 3

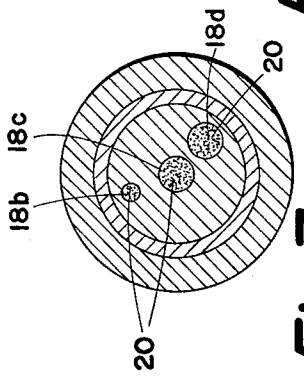


Fig. 7

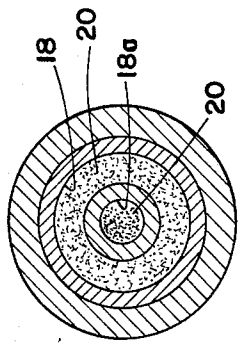


Fig. 2

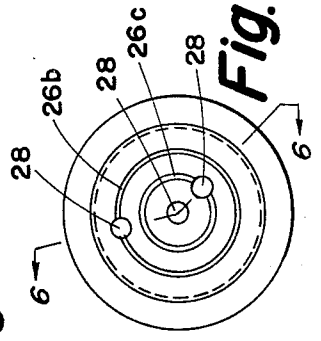


Fig. 5

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United States Patent Office

3,283,719

Patented Nov. 8, 1966

3,283,719

MULTIPLE PURPOSE AMMUNITION

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Filed June 3, 1965, Ser. No. 461,209
4 Claims. (Cl. 102—40)

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 a round of ammunition having multiple purpose capabilities, and particularly to a round of ammunition having a multiple range capability with a fixed weight missile, or a substantially fixed range capability with varying weight missiles.

Multiple purpose ammunition capable of being fired from a single weapon system is very desirable. A typical manifestation of this desire would be a single tracer cartridge having the capability of being fired to different ranges from a single barrel weapon. This typical desire is not abstract but very real since major weapon systems are extant which have multi-range capability, selectivity of the desired range and trajectory based on an estimation derived from firing a spotter-tracer projectile into the target. Heretofore, to accommodate this range-trajectory estimation a multiplicity of spotter-tracer cartridges were required. More specifically, if the major weapon system had a long and a short range capability at least two different tracer cartridges displaying like long and short range capabilities had to be employed. The use of two different spotter-tracer cartridges necessarily demanded two different launching means. Needless to say this weapon-spotter-tracer system combination was generally inefficient. The word went out to develop a better spotter-tracer system. Hence, the present invention was conceived.

There are other conceivable applications for multiple purpose ammunition. For example, an infantryman at times has need for signalling means (e.g. a flare). A flare launcher plus flare cartridges necessarily means additional weight to be carried. Single caliber rounds of ammunition having dual purposes and capable of being launched from the same weapon would be highly desirable to this infantryman. That is, he would carry a supply of single sized ammunition, one group being adapted to fire a flare missile and the other the typical projectile. However, in this illustration and in readily ascertainable others, the missile weights vary and range capability accordingly varies. The problem is to maintain range while varying the missile weight. The present invention satisfies this problem.

Multiple purpose ammunition could also be used in mortar systems where variable range single rounds would conceivably be desirable; shotgun ammunition where constant range with varying missile weights is desirable; and many other applications which one skilled in the ammunition art would readily recognize.

As tacitly indicated above there are rounds of single caliber ammunition which are used for multiple purposes. Typical of this are shotgun rounds which use light weight shot pellets or a rifled slug, both type of rounds fired from a single gun. However, the heavier slug has a greater range than the lighter shot pellets. In the above tracer cartridge illustration it was pointed out that a long range tracer round would require a larger caliber round and a different launcher than that required for the short range spotter-tracer round.

Varying the application or function of any round of ammunition results in many disadvantages of which those mentioned above are typical. With use in an appropriately designed weapon the present inventive round of ammunition avoids many of these inherent disadvantages.

Accordingly, it is an object of the present invention to provide a round of ammunition having multiple purpose capabilities characterized by multiple range capability with a fixed weight missile, or a substantially fixed range capability with varying weight missiles.

It is a further object of the present invention to provide a round of ammunition having multiple purpose capabilities which round may be launched in accord with all or some of its capabilities from a single barrel weapon system or from different weapon systems for each of the round's capabilities.

It is still an object of the present invention to provide a round of ammunition having multiple purpose capabilities, which round is characterized by a plurality of separate propellant compartments and separate priming means for each propellant wherein one or a multiplicity of propellants may be selectively initiated to propel a given missile to a desirable range.

The foregoing and additional objects and advantages of the present invention will become apparent from the following description thereof; consideration being given also to the attached drawings in which:

FIG. 1 is a longitudinal view, partly in cross-section, of the round of ammunition of the present invention illustrating one embodiment thereof, showing in phantom outline a portion of a weapon system in which the present invention may be used;

FIG. 2 is a view taken along the line **2—2** of FIG. 1;

FIG. 3 is an end view of FIG. 1 showing further details of construction;

FIG. 4 is a view taken along the line **4—4** of FIG. 1;

FIG. 5 is an end view of the inventive round showing another embodiment thereof;

FIG. 6 is a fragmentary view taken along the line **6—6** of FIG. 5;

FIG. 7 is a view taken along the line **7—7** of FIG. 6.

In accordance with the present invention and referring to the drawings in which like reference numerals refer to like parts throughout, **10** refers generally to a round of ammunition having a casing **12** in which a projectile or missile **14** is placed. In the embodiment of this invention illustrated in FIG. 1 the missile **14** is a fin-stabilized projectile. However, the missile may take any form or shape required for a desired application. To the rear of the missile **14** and within the casing **12** is a propellant chamber **16**. The propellant chamber **16** is fixed to the inside wall of the casing **12** and contains a plurality of compartments **18**, **18*a***, **18*b***, **18*c*** and **18*d*** (see FIG. 1 and FIG. 6) containing a propellant **20** in an amount and of a nature suitable to a particular use. In FIG. 1 the compartments **18** and **18*a*** are arranged concentrically in fixed relationship to each other with their common axis coaxial with that of the round **10**. Although FIG. 1 shows two concentric compartments, the number thereof are not limited to two. Three and more compartments could be arranged as one skilled in the munitions art could readily see. FIGS. 6 and 7 show the compartments **18*b***, **18*c*** and **18*d*** arranged longitudinally axially with respect to the round **10**, and in fixed space relationship with each other with their respective axes parallel to each other but not necessarily in the same plane. The number of compartments of FIG. 3 can be increased in number and accordingly arranged to meet a desired application.

Referring to FIG. 1 the compartments **18** and **18*a*** have open forward ends and closed rearward ends. The rearward closed ends of the compartments **18** and **18*a*** form the rearward end **22** of the propellant chamber **16** which, in this embodiment, is positioned in the same plane with the flange **24** of the round **10** to form the rearward end of the round **10**.

The rearward end **22** of the propellant chamber **16** contains two annular grooves **26** and **26*a*** concentrically

fixed with respect to each other and circumferentially aligned respectively with compartments **18** and **18***a*. The number of grooves **26** and **26***a* will be determined by the number of compartments used. The annular grooves **26***b*, **26***c*, and **26***d* of the embodiment of FIGS. 5 and 6 are arranged so that the axes of the compartments **18***b*, **18***c*, and **18***d* intersect a point on the center portion of one each of the respective grooves. The function of the grooves will be come apparent further on in the course of this description.

A primer **28** operatively communicates with each of the propellants **20** in each of the compartments **18**, **18***a–d*. The primers **28** are fixed to the rearward end **22** of the propellant chamber **16** and are recessed in the annular grooves **26**, and **26***a–d*. In the embodiments illustrated the primers **28** are percussion type primers. Other type primers such as electrical primers may be used.

The compartments **18**, etc. are suitably separated from each other to insure that only one propellant **20** of one compartment will ignite when the primer **28** communicating with that propellant is initiated. To insure that reverse flow of ignited propellant gases will not cause the remaining unignited propellant to ignite the open forward ends of the compartments **18**, **18***a–d*, are enclosed by a sealing disc **30** which is impermeable to the ignited propellant gases. The disc **30** is constructed to conform to the annular area of the respective compartments. The material used for the disc **30**, although impermeable to reverse flow of propellant gases, is of such a nature so as not to offer any substantial resistance to the initial propellant **20** ignition.

As shown in phantom outline in FIG. 1 the round **10** is in a single barrel **32** weapon which has a multiple firing pin mechanism **34**. For illustration purposes it will be assumed that the round **10** has a long range and a short range capability. The propellant **20** in the compartment **18**, will provide the energy for the long range firing while the propellant **20** in the compartment **18***a* will provide the short range energy. Accordingly, the weapon contains an annular firing pin for long range firing and a center firing pin **38** for short range firing. Assuming further that the choice of firing pin is selectable, the operator of the weapon selects the long or short range pin as the situation calls for. In this illustration the desire is for a long range firing. The operator selects long range and actuates the long range annular firing pin **36** which in turn strikes the primer **28** situated in groove **26**. The primer **28** in turn initiates ignition of the propellant **20** which subsequently provides the energy necessary for firing the projectile **14**. This long-short range firing would find application with tracer cartridge used with multiple range major weapon systems where the trajectory and range of the major weapon payload is determined by that of the tracer projectile.

As can be readily understood the grooves **26**, **26***a–d* will accommodate a multiplicity of concentric annular firing pins. The arrangement will eliminate an alignment problem when incorporating the round **10** into a weapon barrel.

Other embodiments of the present invention could be readily developed by those skilled in this particular art. As one example, it can be understood that the propellant chamber **16** could be adapted so that either primer **28** would cause the ignition of both propellant charges **20** by simply bleeding substantially simultaneously the primer flash into both chambers **18** and **18***a*. For short range firing the center primer **28** would be used to fire the propellant in chamber **18***a* only. For long range capability the annular primer **28** would initiate the propellants in both chambers **18** and **18***a*; thus obtaining the combined energy effect of the propellant in each chamber.

While the invention has been described with reference to a particular example and application thereof which give satisfactory results, it will be understood by those skilled in the art to which the invention appertains, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is my intention, therefore, in the appended claims to cover all such changes and modifications.

I claim:

1. A round of ammunition having multiple range capability including

a cartridge case having forward and rearward ends;

a single projectile in the forward end of said cartridge case and forming a forward end closure therefor;

a propellant chamber in the rearward end of said cartridge case, said propellant chamber having a plurality of laterally spaced longitudinally extending compartments, each of said compartments having a forward end and a rearward end;

a propellant charge in each of said compartments; and

a primer in each of said compartment rearward ends.

2. A round of ammunition having a multiple range capability including

a cartridge case having forward and rearward ends;

a projectile in said cartridge case;

a propellant chamber in said cartridge case and rearwardly of said projectile, said propellant chamber having a plurality of separated compartments concentric with each other and coaxial with said cartridge case;

a propellant charge in each of said compartments and a primer in each of said compartment rearward ends adapted to operatively communicate with the propellant charges within the respective compartments.

3. A round of ammunition having multiple range capability including

a cartridge case having forward and rearward ends;

a projectile in said cartridge case;

a propellant chamber in said cartridge case and rearwardly of said projectile, said propellant chamber having a forward end and a rearward end, said propellant chamber rearward end cooperating with said cartridge case rearward end to form an enclosure therefor, said propellant chamber having a plurality of separated concentric compartments coaxial with said cartridge case, said propellant chamber rearward end defining a plurality of annular grooves one such groove for each of said compartments and in alignment therewith;

a propellant charge in each of said compartments;

a primer in each of said grooves adapted to operatively communicate with the propellant charges within the respective compartments.

4. A round as set forth in claim **3** in which each of said compartments includes a frangible disc over the forward end thereof, said disc being so constructed and arranged that it will rupture upon detonation of the propellant charge contained within its respective compartment.

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