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PROJECTILE CARRYING VEHICLE

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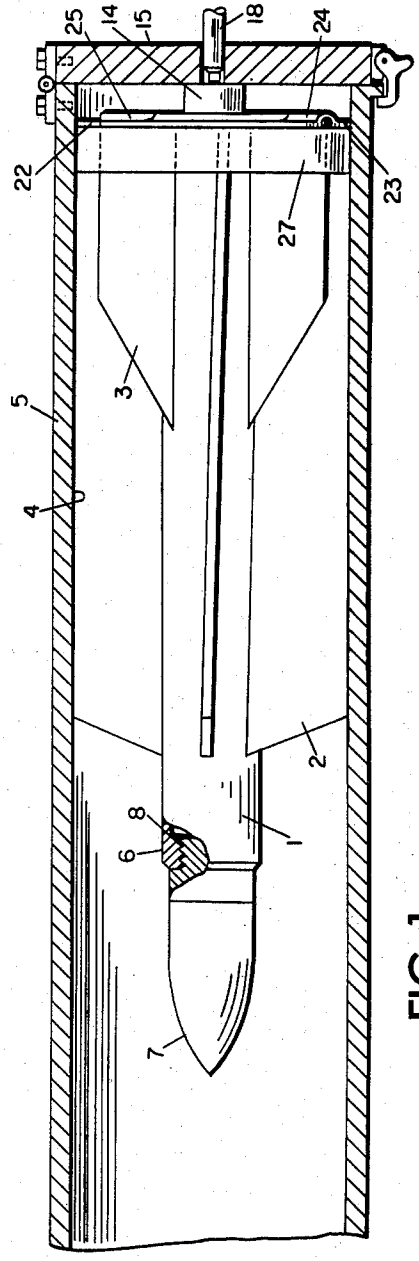


FIG. 1

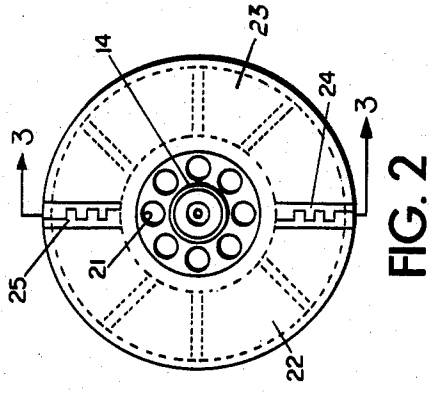


FIG. 2

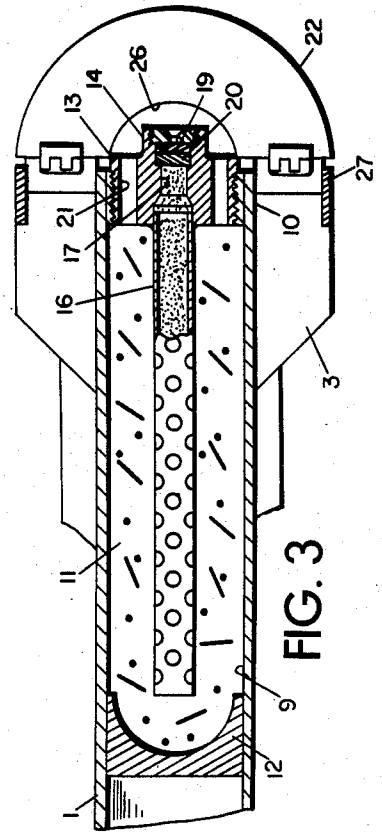


FIG. 3

INVENTORS
IRWIN R. BARR
RICHARD S. DOWD
JOHN W. THOMPSON

BY Billy G. Corber

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PROJECTILE CARRYING VEHICLE

Irwin R. Barr, Kingsville, and Richard S. Dowd and John W. Thompson, Baltimore, Md., assignors to Aircraft Armaments, Inc., Baltimore, Md., a corporation of Ohio

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6 Claims. (Cl. 102—50)

This invention relates to projectiles and more particularly to a vehicle for adapting explosive projectiles of various sizes and shapes to a large bore mortar gun.

The proper size and shape of projectile for the most effective attack on a selected target depends largely upon the nature of the target and its relative range. It is, therefore, obviously desirable to provide means whereby the same gun may be employed for firing a number of different types of projectiles.

An object of this invention is to provide a projectile carrying vehicle which may be fired from a conventional large bore gun such as a mortar. The vehicle is provided with a gas generating propellant fuel having a short burning time which when ignited rapidly pressurizes a chamber formed between an obturating disc carried by the vehicle and the gun breech to effect maximum acceleration of the vehicle and projectile assembly by the time it leaves the gun barrel.

Another object of this invention is to provide a vehicles which aerodynamically stabilizes the projectile and provides a low drag configuration whereby the maximum projectile range is obtained.

Still another object of this invention is to provide a projectile carrying vehicle of simple, low cost construction which is adapted to accommodate various sizes and shapes of projectiles.

Further and other objects will become apparent from a reading of the following description taken in combination with the accompanying drawings wherein like numerals refer to like parts.

In the drawing:

Figure 1 is a fragmentary sectional side view showing the projectile carrying vehicle of this invention seated within the bore of a mortar gun.

Figure 2 is a rear view of the projectile carrying vehicle.

Figure 3 is a view taken on line 3—3 of Figure 2.

As shown in Figure 1, the vehicle includes a generally tubular housing 1 having a plurality of long fins 2 and a plurality of short fins 3 alternately and symmetrically arranged around the outer periphery of the housing and rigidly secured thereto. Long fins 2 are canted slightly relative to the longitudinal axis of housing 1, to induce a spinning motion into the vehicle as it moves along its flight path for counteracting any unbalancing forces produced by fin misalignment which would otherwise tend to cause the vehicle to veer from the selected course. Both the long and short fins extend radially outwardly from the housing to slidably engage the inner wall of bore 4 of a conventional mortar gun 5 and allow only axial movement of the vehicle relative to the gun.

The forward end 6 of housing 1 is provided with suitable means for rigidly securing a projectile 7 thereto in generally coaxial alignment such as by threads 8 formed in the inner wall of housing 1.

A combustion chamber 9 is provided within housing 1 adjacent the rearward end 10 thereof for carrying a suitable quantity of fast burning, gas generating propellant

11 as shown in Figure 3. Chamber 9 extends rearwardly from a transverse bulkhead 12 secured within housing 1 to an igniter support plug 13 which threadedly engages the inner wall of housing 1 in the extreme rearward end thereof. Plug 13 is provided with an axial extension 14 projecting rearwardly beyond the end of housing 1 which is adapted to seat against breechblock 15 of the mortar gun. A perforated igniter sleeve 16 carried by plug 13 extends axially into combustion chamber 9 so as to contact the propellant carried therein. Sleeve 16 is filled with a suitable fast burning powder. A bore 17 formed in plug 14 communicates with the material in sleeve 16 whereby a percussion element 20 carried within the bore may be exploded to start the powder burning in the sleeve and ignite the propellant stored in combustion chamber 9 by allowing a conventional firing pin 18 carried by breechblock 15 to strike a hammer 19 located within bore 17 adjacent percussion element 20. When propellant 11 burns, a large quantity of gas is produced which is released through a plurality of exhaust ports 21 formed in plug 14 as best shown in Figure 2.

Both long fins 2 and short fins 3 extend rearwardly to the extreme edge of housing 1 to provide support for a pair of semicircular obturating plates 22 and 23 arranged to provide a transverse wall for sealing bore 4 of the gun and provide a substantially leak-proof chamber between the rear end of the vehicle and breechblock 15. Thus as the gas from the combustion chamber is exhausted through ports 21, pressure is built up which reacts against the obturating plates causing the projectile carrying vehicle to be rapidly accelerated to the desired maximum velocity by the time it leaves the gun. An annular reinforcing ring 27 concentrically arranged relative to housing 1 and secured to fins 2 and 3 adjacent the rearward end thereof provides continuous support for the outer periphery of the obturating plates while the fins provide support in the area between the outer periphery and the housing so that reasonably thin plates may be employed to absorb the load. The outside diameter of reinforcing ring 27 is substantially the same as the diameter of the gun bore. A semi-circular cutout 26 is provided in each obturating plate 22 and 23 to provide a circular opening substantially the same diameter as plug 13 for avoiding interference with exhaust ports 21.

Obturating plates 22 and 23 are swingably carried by a pair of short fins 3 through hinges 24 and 25 so that they are free to swing rearwardly into a low drag trailing position generally axially aligned with the fins and housing as shown in Figure 3. After the pressure created by the burning propellant subsides, air drag applied to the front side of the obturating plates, due to the forward motion of the vehicle, effects swinging movement thereof to the low drag position. The obturating plates may be carried by the vehicle throughout its flight for measuring aerodynamic stability or they may be dropped shortly after the vehicle is fired from the gun.

In using the projectile carrying vehicle, a conventional large bore gun such as a mortar is employed. A vehicle carrying the desired shape and size of projectile is inserted in the bore of the gun. The obturating plates are swung to the sealing positon abutting the plurality of fins and the breechblock is locked in position. Firing pin 18 is then released causing it to strike hammer 19 in bore 17 which detonates the igniter and effects burning of the propellant. The gas generated by the burning propellant creates a rapidly rising pressure which acts against the obturating plates to accelerate the vehicle and projectile assembly. The assembly reaches a maximum velocity at the end of burning which occurs before the vehicle leaves the gun.

As the vehicle and projectile assembly leave the gun, free stream air acting on obturating plates 22 and 23

causes them to swing into the low drag position generally axially aligned with the fins. Long fins **2** being canted relative to the longitudinal axis of housing **1** causes the assembly to spin at a moderate rate whereby directional errors due to fin misalignment will be nullified. Both the long fins **2** and the short fins **3** cooperate to aerodynamically stabilize the assembly to insure that the longitudinal axis of the housing will remain generally aligned with the direction of flight and in a minimum drag altitude to obtain the greatest possible range.

The vehicle must of course be designed for a particular gun so that the diameter defined by the fins **2** and **3** is substantially the same as the diameter of the gun bore whereby the vehicle is concentrically supported for only axial movement relative to the bore. Various sizes and shapes of projectiles, including standard projectiles now in common use, may be employed with the vehicle so long as their diameter does not exceed the bore diameter of the gun and so long as their weight is not so great as to de-stabilize the vehicle and projectile assembly.

For a given quantity of propellant, the range of the vehicle and projectile assembly will vary according to the weight of the projectile. Thus for long range targets a lightweight projectile may be employed and for short range targets a larger and heavier projectile may be used. The most effective shape of projectile for a particular target may also be taken into consideration when selecting the ammunition. The versatility afforded by the projectile carrying vehicle described herein will allow a single gun to serve well in a great number of tactical situations.

It is to be understood that certain alterations, modifications and substitutions may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A vehicle for aerodynamically stabilizing a projectile and adapting it to a gun having a bore larger than the diameter of said projectile comprising, a tubular housing, means carried by said housing adjacent the forward end thereof for securely mounting said projectile on said housing, a plurality of radially extending fins carried by said housing adjacent the rear end thereof for aerodynamically stabilizing said vehicle and projectile, the diameter defined by the outer edge of said fins being substantially equal to the bore diameter of said gun, and the length of said fins being sufficient to stabilize and support said vehicle and projectile for only axial movement within said gun, a propellant carried within said housing for generating gas, an opening formed in the rear end of said housing for exhausting said gas within the bore of said gun, and a pair of semi-circular obturating plates swingably carried by the rear ends of two of said fins and arranged to circumferentially engage the bore of said gun for trapping said exhaust gases within said gun whereby to accelerate said vehicle, said plates being responsive to air drag after leaving said mortar to swing into approximate alignment with the vehicle flight path.

2. A vehicle for aerodynamically stabilizing a projectile and adapting it to a gun having a bore larger than the diameter of said projectile comprising, a generally cylindrical housing, means for mounting said projectile on said housing in coaxial alignment therewith, a plurality of radially extending fins rigidly carried by said housing, said fins being canted relative to the longitudinal axis of said housing and extending substantially throughout the length thereof, the diameter defined by the outer edge of said fins being substantially the same as the bore diameter of said mortar, and a pair of semi-circular plates carried by the rearward ends of two of said fins and arranged to sealably engage the bore of said mortar, said plates being swingably carried by said housing for movement from the sealing position abutting said fins to a trailing position generally axially aligned with said fins.

3. A vehicle for aerodynamically stabilizing a projectile and adapting it to a gun having a bore larger than the diameter of said projectile comprising, a housing, means for securing the projectile to the forward end of said housing in generally coaxial alignment therewith, a plurality of fins carried by said housing and extending outwardly to slidably engage the bore of said mortar and support said vehicle for only axial movement relative thereto, said fins extending to the rearwardmost end of said housing, an annular reinforcing ring carried by said fins adjacent the rearwardmost end thereof and concentrically arranged relative to said housing, said ring having an outside diameter substantially equal to the bore diameter of said mortar, and obturating plates swingably carried by said fins for free movement from a bore sealing position abutting said ring and fins to a low drag trailing position generally axially aligned with said housing.

4. A vehicle for aerodynamically stabilizing a projectile and adapting it for firing from a closed breech gun having a bore larger than the diameter of said projectile comprising, a generally tubular housing, means carried by said housing for securing said projectile thereto in generally coaxial alignment, a plurality of radially extending fins rigidly carried by said housing and symmetrically arranged around the outer periphery thereof, said fins extending outwardly to slidably engage the bore of said gun and support said vehicle and projectile for only axial movement relative thereto, a transverse bulkhead rigidly carried within said tubular housing and spaced intermediate of the two ends thereof, a plug carried by the rearward end of said housing to form a combustion chamber within said housing between the plug and said bulkhead, a quick burning, gas generating propellant carried within said combustion chamber, igniter means carried by said plug for igniting said propellant, said plug having a plurality of exhaust ports formed therein for releasing the gas generated by burning the propellant, and obturating plates swingably carried by said fins and adapted to swing against and be supported by the ends of said fins to seal the bore of said gun rearwardly of said vehicle to form a pressure tight chamber within said gun confining said gas whereby the pressure created causes said vehicle and projectile to accelerate rapidly to a high velocity, said obturating plates being adapted to swing rearwardly into generally axial alignment with said fins after firing whereby to minimize aerodynamic drag.

5. A vehicle for aerodynamically stabilizing a projectile and adapting it for firing from a closed breech gun having a bore larger than the diameter of said projectile comprising, an elongated housing, means carried by said housing for securing a projectile thereto in generally coaxial alignment, a plurality of stabilizing fins rigidly carried by said housing and generally symmetrically arranged around the outer periphery thereof, said fins extending outwardly to slidably engage the bore of said gun and support said vehicle and projectile for only axial movement relative thereto, a combustion chamber formed in said housing, said housing having an aperture formed therein and communicating with said chamber to provide an exhaust port, propellant fuel carried within said housing, means for igniting said propellant to generate gas within said combustion chamber for exhausting through said port, and a plurality of obturating plates swingably carried by said fins for movement from a position abutting said fins to a position generally aligned with said fins, said obturating plates providing a substantially pressure tight partition transversely of said bore when in said position abutting said fins whereby to provide a closed chamber adjacent said vehicle to confine said gas and produce a force accelerating said vehicle and projectile to the desired velocity, said plates being responsive to drag forces for swinging to the free flight position generally aligned with said fins.

6. A vehicle for aerodynamically stabilizing a projectile and adapting it to a gun having a bore larger than the

diameter of said projectile comprising, an elongated housing, means for mounting said projectile on said housing in generally coaxial alignment therewith, a plurality of radially extending fins rigidly carried by said housing, certain of said fins being canted relative to the longitudinal axis of said housing for effecting rotational movement thereof, the diameter defined by the outer edge of said fins being substantially the same as the bore diameter of said gun whereby to slidably support said housing within the gun for only axial movement, and a plurality of obturating plates carried by the rearward ends of two of said fins and arranged to sealably engage the bore of said gun to provide a pressure chamber, said plates being swingably carried by said housing for movement away from the sealing position abutting said fins for minimizing aerodynamic drag.

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