

Dec. 6, 1966

J. J. DONNELLY ET AL

3,289,587

FIN STABILIZED PROJECTILE

Filed July 7, 1965

2 Sheets-Sheet 1

Fig. 1

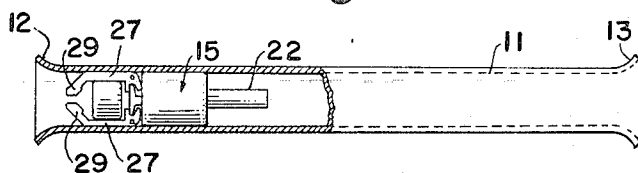


Fig. 2

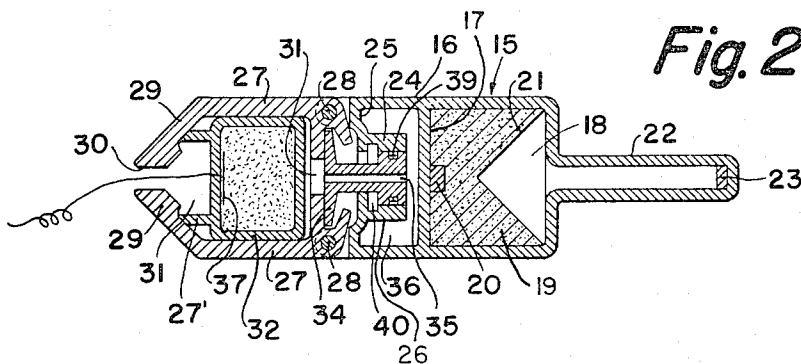
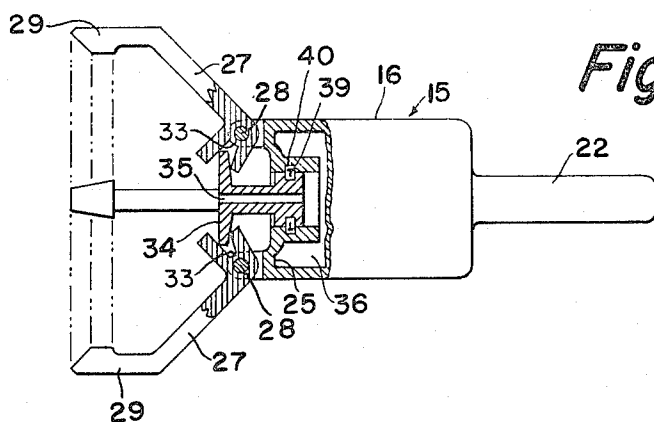


Fig. 3



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Fig. 4

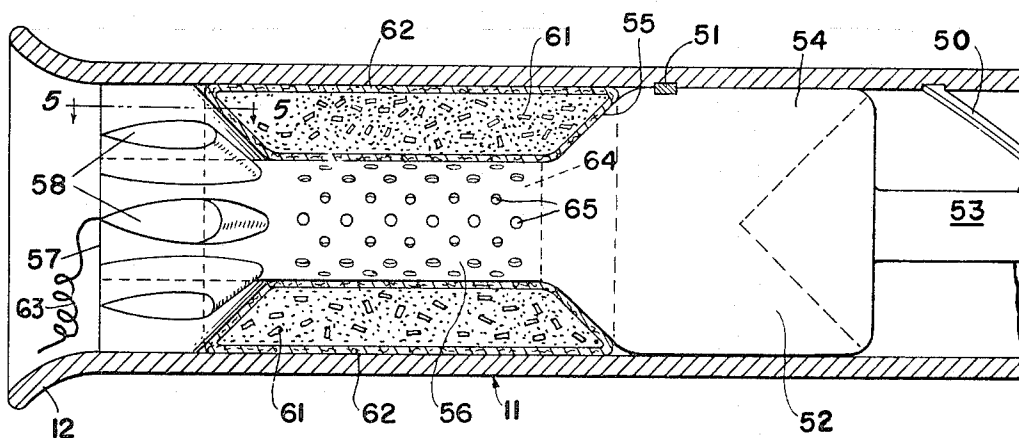


Fig. 6

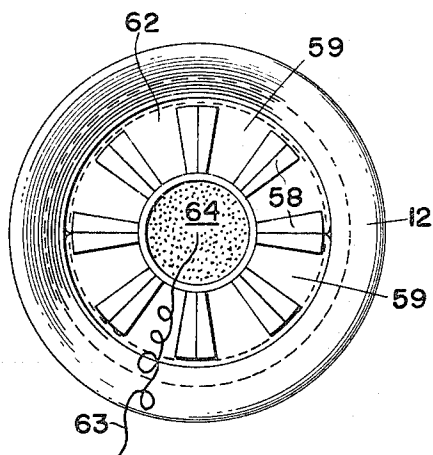
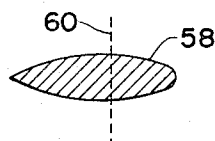


Fig. 5



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FIN STABILIZED PROJECTILE

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5 Claims. (Cl. 102-49)

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 propellant actuated devices and, more particularly, to fin stabilized projectile or rocket arrangements. The invention is especially directed to improved projectile constructions which are adapted for use in a breechless, recoilless launcher or weapon.

Among the objects of the invention are the provision of such a weapon that is much lighter in weight than prior recoilless weapons, is simpler in construction, more accurate, and more reliable over a wide temperature range.

A further object of the invention is to provide a weapon having a more equal pressure distribution throughout its launching tube and particularly at the muzzle end thereof.

In one aspect of the invention a propellant actuated device is provided which includes a main body having a peripheral portion, fin means connected to the body and extending rearwardly of the body and outwardly at least as far as the peripheral portion, the fin means having protuberance means thereon, and propellant means positioned forwardly of the protuberance means.

These and other objects, features and advantages will become apparent from the following description and accompanying drawings in which:

FIG. 1 is an elevational view partially broken away in section of a preferred weapon construction embodying the principles of the invention.

FIG. 2 is an enlarged sectional view of the projectile arrangement of FIG. 1.

FIG. 3 is an elevational view of the FIG. 1 projectile in flight with its fins in their stabilizing position.

FIG. 4 is a view similar to FIG. 1 of a modified construction.

FIG. 5 is a sectional view of one of the fins taken along line 5-5 of FIG. 4.

FIG. 6 is a rear end view of the arrangement in FIG. 4.

The breechless and recoilless weapon of FIG. 1 includes a launching or gun tube 11 having open rearward and forward ends 12, 13, each being flared outwardly and the forward end 13 defining a muzzle portion of the tube 11.

Positioned in the tube 11 is a projectile arrangement shown generally at 15 (FIGS. 1, 2) and including a main cylindrical body 16 the periphery of which is slidable longitudinally within the launching tube. Integral with body 16 is a transverse member or section 17 that divides the body interior into a forward chamber 18 containing a high explosive material 19 having a detonating means 20. The conical cavity formed by copper cone 21 and the cavity within the forward reduced portion 22 of the body 16 form a stand-off distance or spacing between the cone 21 and preferably an electrical fuze 23. An inner, concentrically spaced sleeve 24 is integrally connected with the body 16 by its annular rear wall 25 to define a cylindrical piston support for piston 26 which is slidable therein. Pivotaly connected as at 28 to an appropriate rear portion of body 16 is a plurality of fin

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members 27 each having an inwardly extending tab or protuberance portion 29 which are of an enlarged transverse cross-sectional dimension to define a central throat or nozzle-like longitudinal passage 30. Within the cavity 31 formed by the folded fins 27 is a consumable or frangible propellant container 32 having its sidewall portions supported by the fin members 27, or in use as a free rocket container 32 is provided with sufficient strength or the fins are provided with an initial retaining ring 27¹. The forward portions of the fins 27 each have their innermost edges provided with a notch 33 (FIG. 3) or the like to normally receive laterally extending edges of a rear disk 34 carried by the piston 26. A central passage 35 through the piston places the cavity 31 in communication with the annular pressure chamber 36 in the rear portion of the body 16.

Preferably the propellant in container 32 is single-grain or multiple grains arranged according to a predetermined geometrical configuration and is ignited by an electrical ignition means 37. The gas generated by the propellant will develop sufficient pressure within cavity 31 and ultimately chamber 36 to first create sufficient thrust at the nozzle or throat 30 to provide the desired forward propulsion and then to move the piston 26 rearwardly when the pressure in cavity 31 is reduced to a predetermined level relative to the pressure in chamber 36. The edges of piston disk 34 will pivot the fins 27 and their tabs 29 outwardly to a predetermined stabilizing or extended position (FIG. 3) where they are held and thereby locked by expansion of snap ring 39 into groove 40 in the internal surface of sleeve 24.

In the arrangement of FIG. 4 the open-ended launching tube 11 is appropriately grooved at 50 to receive the rotating band 51 of projectile body 52 which carries a nose 53 and adjacent high explosive portion 54 in the cylindrical forward portion similar to the projectile of FIG. 2. The rear portion 55 of projectile 52 is tapered or reduced and terminates in a multi-apertured boom 56 that integrally connects therewith a rear or tail fin stabilizing portion 57. Tail portion 57 includes a plurality of laterally extending rigid fins 58 each of stream line contours (FIGS. 4, 5) wherein the common plane (dotted line 60) containing the maximum thickness of each fin also contains a plurality of radially extending throat or nozzle constrictions 59 in the longitudinal passageways between the respectively adjacent fins 58. Positioned around the boom 56 is a complementary pair of annulus propellant sections each containing a multiplicity of elongate propellant grains 61 within an appropriate consumable or frangible container 62. Preferably, an electrical ignition means 63 and booster charge of black powder 64 within the boom will ignite the propellant through the boom apertures 65. Thus, the fins 58 provide a throat or nozzle arrangement for the pressure gas developed by the burning propellant to propel the projectile body 52 forwardly and then render stability to the projectile in flight when the propellant has been consumed or removed.

Various modifications, alterations or changes may be resorted to without departing from the scope of the invention as defined by the appended claims.

We claim:

1. A propellant actuated device comprising, a main body having a peripheral portion, fin means connected to said body and extending rearwardly of said body and outwardly substantially as much as said peripheral portion, said fin means having means protruding from a rear portion thereof and extending inwardly of said peripheral portion for controlling exhausting propellant gas, and

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propellant means positioned forwardly of said inwardly extending portion.

2. The structure in accordance with claim 1 wherein said fin means have forward portions that are pivotally connected to said body.

3. The structure of claim 2 in which there are provided means for moving rearward portions of said fin means outwardly about said pivotal connection, to an extended position and means for maintaining said fin rearward portions in said extended position.

4. The structure of claim 1 in which said propellant is enclosed in a consumable case having a sidewall portion thereof supported by said fin means during consumption of said propellant and case.

5. In a recoilless weapon having a launching tube, a propellant actuated device comprising

a main body portion having a peripheral portion slidable in said tube,

fin means connected to said body and extending rear-

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wardly of said body and outwardly at least as far as said peripheral portion,

said fin means having means protruding from a rear portion thereof and extending inwardly of said peripheral portion for controlling exhausting propellant gas, and

propellant means positioned forwardly of said inwardly extending portion.

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