Aug. 22, 1950 C. F. BJORK ET AL 2,519,878

ROCKET PROJECTILE

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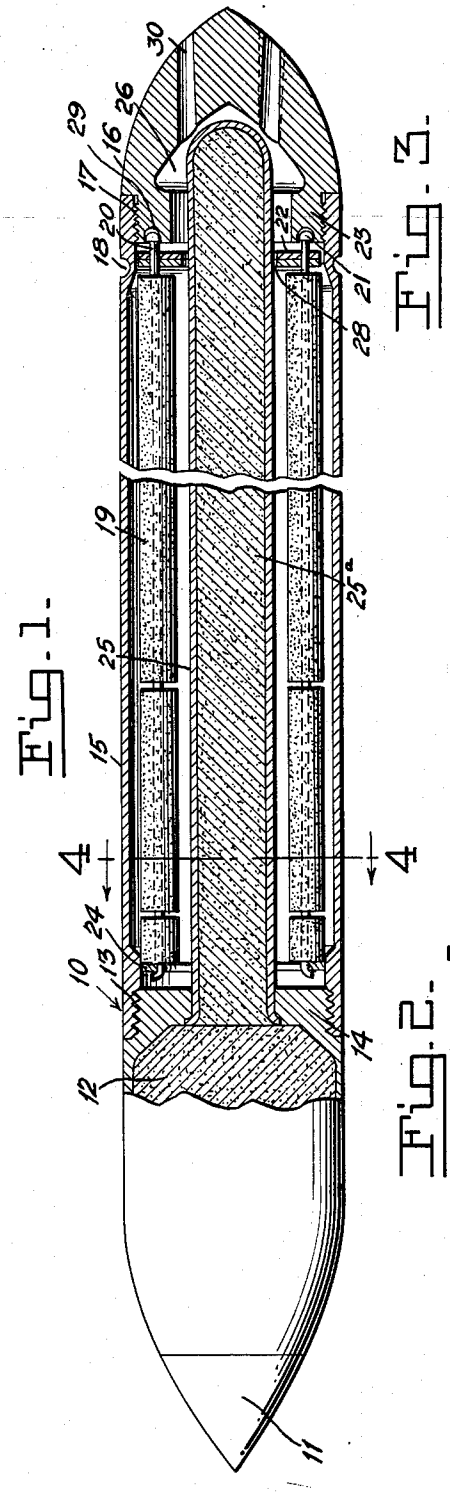


Fig. 1.

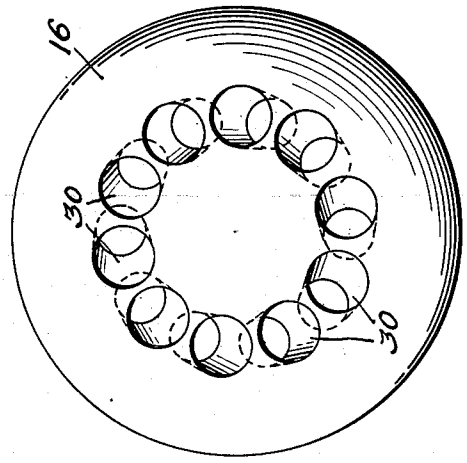


Fig. 3.

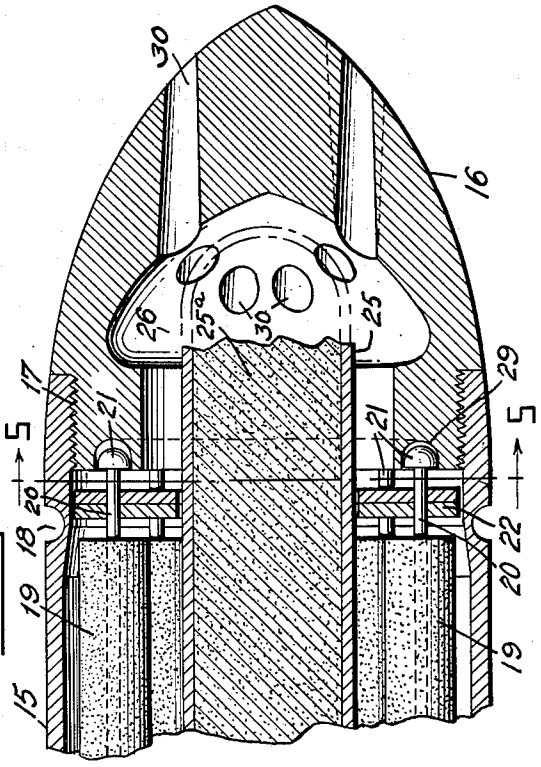


Fig. 2.

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Fig. 4.

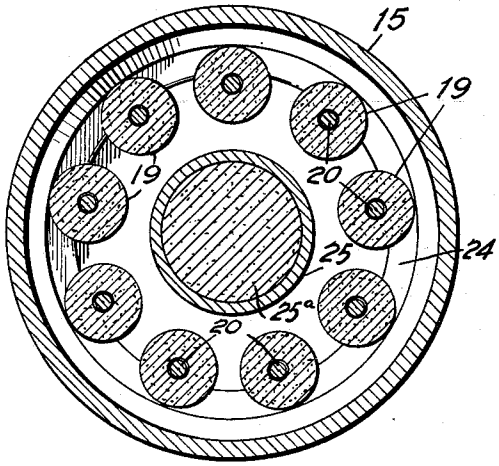


Fig. 5.

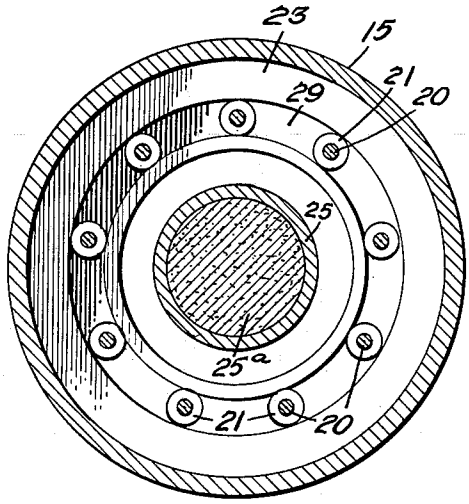


Fig. 6.

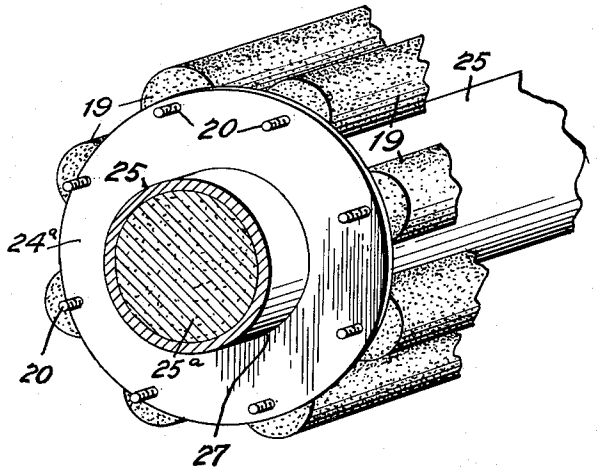
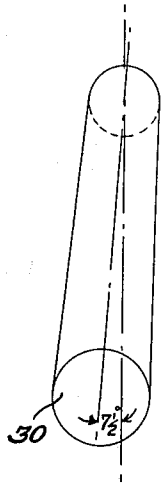


Fig. 7.



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UNITED STATES PATENT OFFICE

2,519,878

ROCKET PROJECTILE

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Application July 31, 1946, Serial No. 687,376

4 Claims. (Cl. 102—49)

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This invention relates to rockets and more particularly to a spin stabilized stream line rocket projectile.

It is well known that rotation of a rocket tends to stabilize its flight. However, the rapid rotation of conventional rocket projectiles distorts or twists the usual propellent materials supported on the usual longitudinal trap wires. We have developed an improved rocket construction in which the propellent material assembly, including the trap, need not spin with the projectile. The spin stabilized rocket projectile of our invention is also of stream line contour, thus having less drag than the conventional rocket with a single expanding conical nozzle at its stern end.

An important object of our invention is to provide a rocket projectile which is spin stabilized but in which the propellent assembly need not spin.

Another object of our invention is to provide an improved propellent assembly for spin stabilized rocket projectiles.

A further object of our invention is to provide a spin stabilized rocket projectile with an improved streamline nozzle construction.

It is still another object of our invention to provide a spin stabilized rocket projectile in which energy is conserved by divorcing the propellent material and its supporting trap from spin.

The specific nature of our invention, as well as other objects and advantages thereof, will be apparent from the following description of the preferred embodiment thereof as illustrated in the accompanying drawings, forming part of the specification, in which like numerals are used to designate like parts throughout the same.

In the drawings:

Figure 1 is an elevation, partly in section, of a rocket embodying the invention,

Figure 2 is an enlarged longitudinal section of the nozzle portion of the rocket shown in Figure 1,

Figure 3 is an elevation view of the stern end of the nozzle shown in Figure 2.

Figure 4 is a transverse section taken on the line 4—4 of Figure 1,

Figure 5 is a transverse section taken on the line 5—5 of Figure 2,

Figure 6 shows an alternative method of securing the front ends of the wires, and,

Figure 7 is a diagrammatic view showing the taper and cant of the nozzle openings.

Referring now to the drawings, the numeral 10 designates a rocket. The head 11 may contain a high explosive charge 12 and a fuse (not shown)

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of conventional construction for detonating the same, and is provided with screw-threads 13 in its base 14 for attachment to the tubular motor casing or body of the rocket 15. A nozzle member 16 is attached to the said body portion 15 by screw threads 17, and the body portion 15 may be provided with an annular safety groove 18 near its rearward end to provide a weakened section to permit the body portion 15 to separate at a definite point should an excessive pressure be generated within the said body.

The propellent charge within the tubular body 15 consists of a plurality of cylindrical powder grains 19, each of which is provided with a cylindrical and concentric perforation extending longitudinally thereof. The said powder grains 19 are strung upon a plurality of trap rods or wires 20 provided with beaded heads 21 for suspending said trap rods 20 from a trap plate 22 positioned near the rearward end of the body portion 15 and adjacent the base portion 23 of the nozzle member 16. The other ends of the said trap rods engage a ring member 24 positioned near the forward end of the body portion 15 to which they may be secured by bending their ends as shown in Figure 1, or in any other convenient manner, such as by screwing them into a disc member 24a as is illustrated in Figure 6. A burster tube 25 containing a suitable burster charge 25a is suspended from the base 14 of the head 11 within the cage formed by the suspended trap rods 20, extending into a cavity 26 in the nozzle member 16 through the openings 28 in the trap plate 22. In the modified form shown in Figure 6, an opening 27 is provided in the disc member 24a.

The beaded heads 21 of the trap rods rest within an annular groove 29 in the base 23 of the nozzle member 16. The said nozzle member is also provided with about ten outwardly tapered openings 30, the axis of each opening being canted with respect to the longitudinal axis of the rocket projectile 10 as is indicated in Figures 3 and 7.

The propellent powder grains 19 may be ignited by any conventional method (not shown) such as an electric squib and a black powder igniter energized by induction or through leads extending outward through one of the openings 30 in the nozzle member 16.

The gaseous products of combustion pass rearward through the openings 30 applying a forward thrust to the projectile. Since the openings 30 are canted with respect to the longitudinal axis of the projectile, the projectile is caused to spin about its axis. The trap rods 20 and the

propellent grains 19 strung thereon do not spin since the trap and propellent assembly is secured neither to the body portion 15 nor to the nozzle member 16. Therefore, the head 11, the body portion 15, the nozzle member 16 and the burster tube 25 are caused to spin at high rotational velocity to stabilize the flight of the projectile. The streamline contour of the rear portion of nozzle member 16 creates minimum drag on the flight velocity of the projectile.

If desired, anti-frictional bearings may be substituted for the beaded heads 21 now acting as bearings within the raceway of the annular groove 28, and the ring member 24.

It is to be understood that the form of our invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention, or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. A rocket projectile comprising, a body portion, a nozzle member having a plurality of tapered openings canted with respect to the longitudinal axis of the projectile attached to the body portion, and a propellent trap assembly concentric with the longitudinal axis of said rocket projectile, mounting means for said trap assembly, bearing means for supporting said mounting means in said rocket, said last means being constructed and arranged to provide for free axial rotation of said trap assembly relative to said rocket body and nozzle while supporting said assembly against longitudinal motion in said rocket.

2. A rocket projectile comprising, a body portion, a propellent powder charge having little lateral strength within said body portion, a nozzle portion secured to said body portion and having automatic means whereby the said projectile is rotated by the discharge of the propellent gases, trapping means for the propellent charge freely mounted within the said body portion, and bearing means to obviate spinning of the propellent during the rotational flight of the projectile.

3. A rocket projectile as in claim 2 in which the trapping and bearing means include a plurality of powder supporting rods each of which is provided with a rounded head portion at the rear end thereof, said rounded head portion bearing against the forward face of the nozzle member so that the nozzle member may revolve freely while the said trapping means remains at rest.

4. A rocket projectile comprising a body portion, propulsion nozzle means attached to said body portion and provided with means for so directing propulsive gases as to impart both rotation and propulsion to said body portion, and a propellent trap assembly concentric with the longitudinal axis of said rocket projectile, mounting means for said trap assembly, bearing means for supporting said mounting means in said rocket, said last means being constructed and arranged to provide for free axial rotation of said trap assembly relative to said rocket body and nozzle while supporting said assembly against longitudinal motion in said rocket.

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