

Aug. 23, 1949.

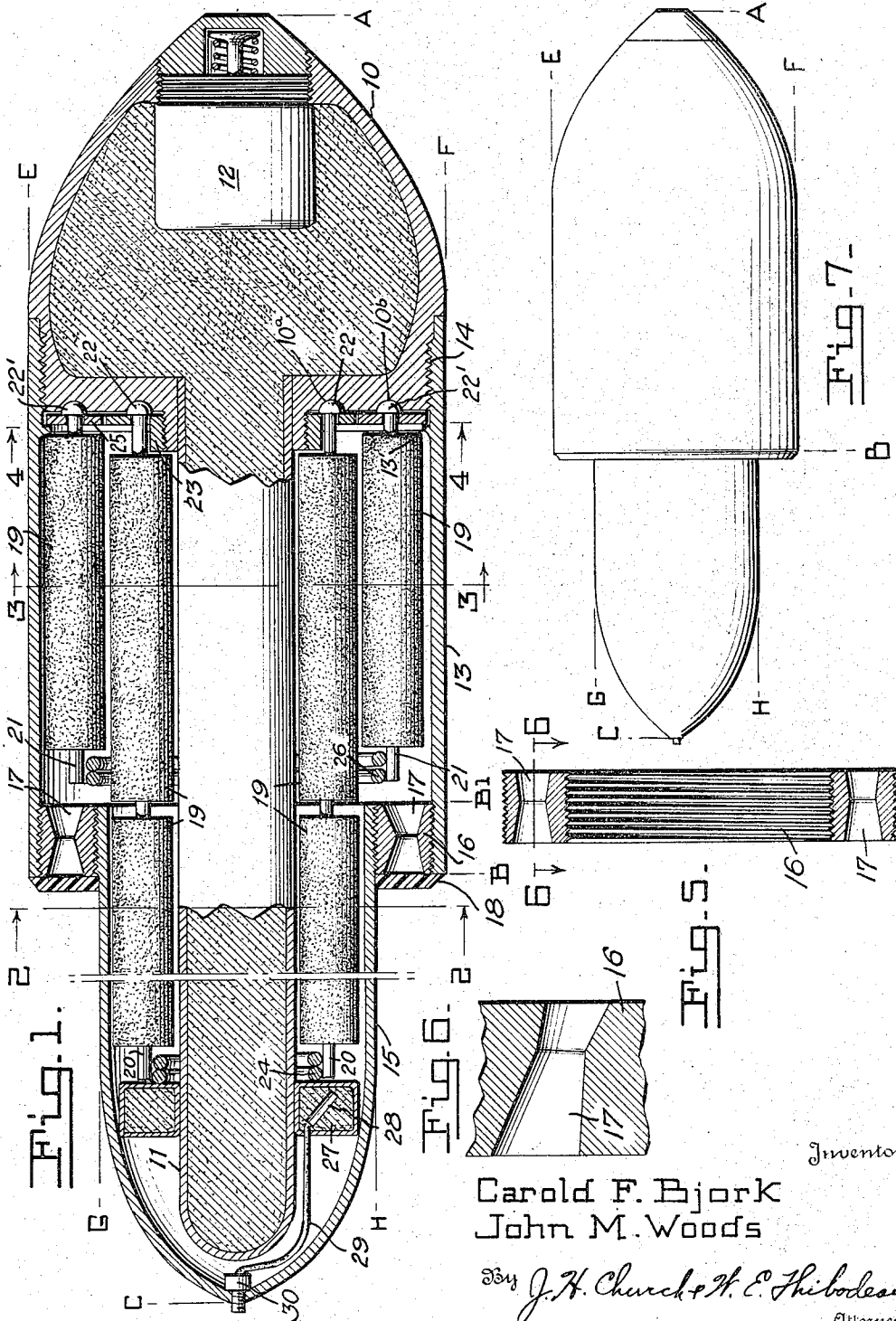
C. F. BJORK ET AL

2,479,718

ROCKET PROJECTILE

Filed Jan. 29, 1947

2 Sheets-Sheet 1



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Fig. 2.

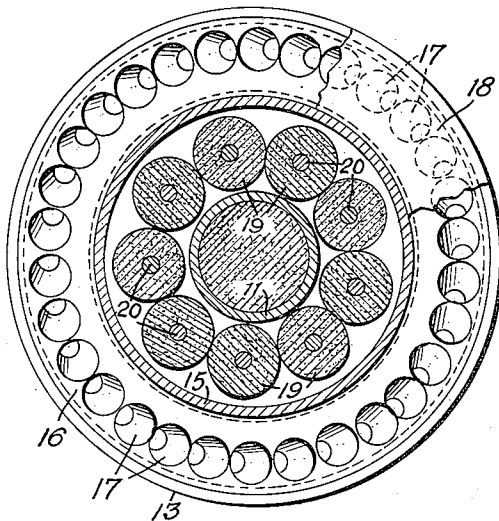


Fig. 3.

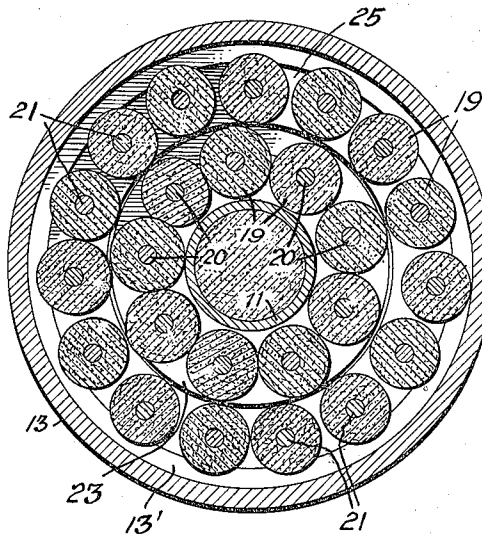
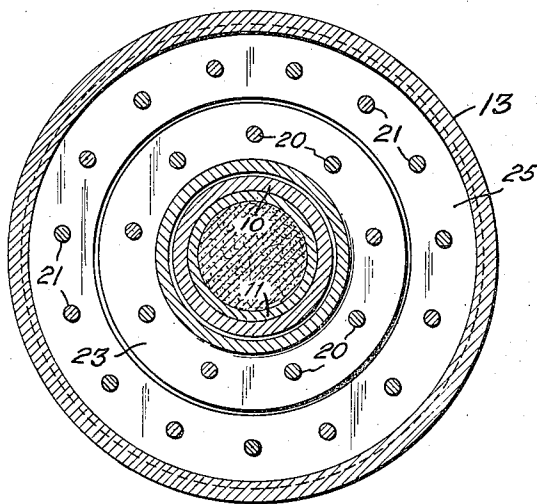


Fig. 4.



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UNITED STATES PATENT OFFICE

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ROCKET PROJECTILE

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of America as represented by the Secretary of
War

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1 Claim. (Cl. 102—49)

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This invention relates to rocket ordnance and more particularly to a spinner type rocket.

It is known to cause spin or rotation of rocket projectiles to stabilize the flight of the rocket. Our invention provides an improved spin-stabilized rocket projectile which has a plurality of peripheral nozzles intermediate its ends, and which has a streamline contour.

It is one of the objects of this invention to provide a streamline rocket projectile which is spin-stabilized by the use of a plurality of Venturi nozzles.

It is another object of this invention to provide a rocket projectile which has a minimum drop-off at the nozzle mouth and hence has a relatively small drag in flight.

It is another object of this invention to provide a rocket projectile which has a relatively high ratio of pay load to overall weight.

It is still another object of this invention to provide a rocket projectile of rugged construction which is not easily damaged in transit.

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 illustrated in the accompanying drawings in which:

Fig. 1 is a longitudinal section of the rocket projectile.

Fig. 2 is a transverse section on line 2—2 of Fig. 1, in the direction of the arrows.

Fig. 3 is a transverse section on line 3—3 of Fig. 1, in the direction of the arrows.

Fig. 4 is a transverse section on line 4—4 of Fig. 1, in the direction of the arrow.

Fig. 5 is a transverse section of the Venturi-nozzle carrying ring shown in Fig. 1.

Fig. 6 is a section on line 6—6 of Fig. 5, in the direction of the arrows.

Fig. 7 is a reduced scale side elevation of the rocket projectile.

Referring to Fig. 1, for the purposes of illustration, the head of the rocket projectile is indicated by the numeral 10. The head 10 supports a rearwardly extending burster tube 11, and may be provided with a nose fuse 12 in its forward portion. A forward motor casing 13 is secured to the head 10 by a threaded joint 14. A combined tail and rear motor casing 15 is secured to the casing 13 by an internally and externally threaded ring member 16. The forward end of the casing 15 communicates with the rear end of the casing 13. The ring member 16 is provided with thirty tapered nozzles 17. As shown in Figs. 1, 2, 5 and 6, the nozzle apertures

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17 are of Venturi cross-section, the axis of each aperture being canted with respect to the axis of the projectile. During shipping, the projectile may be provided with a plastic moisture proof seal 18 secured to the outer face of member 16 to seal the apertures 17, thereby preventing moisture from entering the rocket motor.

Rocket propellant material in the form of tubular grains 19 of double-base powder is supported within the motor casings 13 and 15 on trap wires 20 and 21. A cage of nine trap wires 20 supports eighteen powder grains 19 around the burster tube 11, the forward ends of the wires 20 being upset at 22 and secured in a circumferential groove 10—a of the head 10 by a ring 23 threaded on the rear end of head 10. The rear end portions of wires 20 may be fastened together by a wire ring member 24 in rear motor casing 15. Each wire 20 supports two grains 19 which are disposed in casings 13 and 15, respectively. The trap wires 21 form a fifteen wire cage to support fifteen powder grains 19 disposed outside of the nine grains 19 in casing 13 and adjacent the inner surface of motor casing 13, the wires 21 being upset at their forward ends 22' which are secured in a circumferential groove 10—b in the head 10 by a ring 25 which is held between head 10 and flange 13' on interior of casing 13. The rear end portions of wires 21 are secured to a wire ring member 26 directly forward of the nozzle member 16. A black powder igniter 27 in the form of a doughnut may be provided in the rear end of casing 15 at the rear end of the powder assembly. The squib 28 of the igniter 27 may be connected by wires 29 to a plug-in jack connection 30 for connection to a firing circuit. An induction firing mechanism may be used to eliminate the use of electrical connections.

A rocket projectile embodying our invention has been successfully tested and was shown to be spin-stabilized in actual flight. The tested projectile (Figs 1 and 7) had a total length of 21.5 inches A—C (Fig. 7), the forward motor casing 13 and head 10 being 13 inches in length A—B (Fig. 7), and the rear motor casing and tail 15 being 8.5 inches in length B—C (Fig. 7). The Venturi-nozzle-carrying ring 16 connecting the forward casing 13 and the rear casing 15 had a longitudinal thickness of 1.2 inches B—B—1 (Fig. 1). The outside diameter of the forward casing 13 was 7.2 inches E—F (Fig. 7) and the outside diameter of the rear casing 15 was 5½ inches G—H (Fig. 7), so that the annular face formed by the ring 16 between the forward cas-

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ing 13 and the rear casing 15, in which the Venturi nozzle 17 were disposed, had a width of about 1 inch E—G (Fig. 7). This projectile was designed to carry 6.9 pounds of high explosive to an overall weight of 50 pounds. Actual operation of this projectile showed that its successful operation, viz. spin-stabilized flight projecting the desired quantity of high explosive, was due to its novel construction as above described. The tests demonstrated that a rocket projectile of relatively short length with a large load of high explosive can be spin-stabilized in flight.

Numerous modifications of our invention will be readily apparent to those skilled in the art. We claim:

In a rocket projectile, the combination of a forward portion comprising an explosive head and a motor casing; a rear portion comprising a charge carrying tail and a second motor casing communicating with said first motor casing, the outside diameter of the rear portion being substantially 70% of the outside diameter of the forward portion, the length of the rear portion being substantially 65% of the length of the forward portion and the total length of the projectile being substantially three times the outside diameter of the forward portion; a propellant charge in each of said casings; and a ring disposed about the forward end of said rear portion, and within the rear end of said forward portion and pro-

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vided with a plurality of Venturi-nozzles communicating with the casing in the forward portion, the axes of each of said nozzles lying in a hyperboloid of revolution co-axial with said projectile with said nozzle axes so uniformly angularly disposed relative to the longitudinal axis of the projectile that the nozzles are rearwardly directed with a tangential component outwardly from the periphery of the rear portion, so that the projectile is spin-stabilized in flight.

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