Dec. 25, 1956 C. R. VEGREN 2,775,163

PRE-SPIN DEVICE FOR ROCKET LAUNCHER

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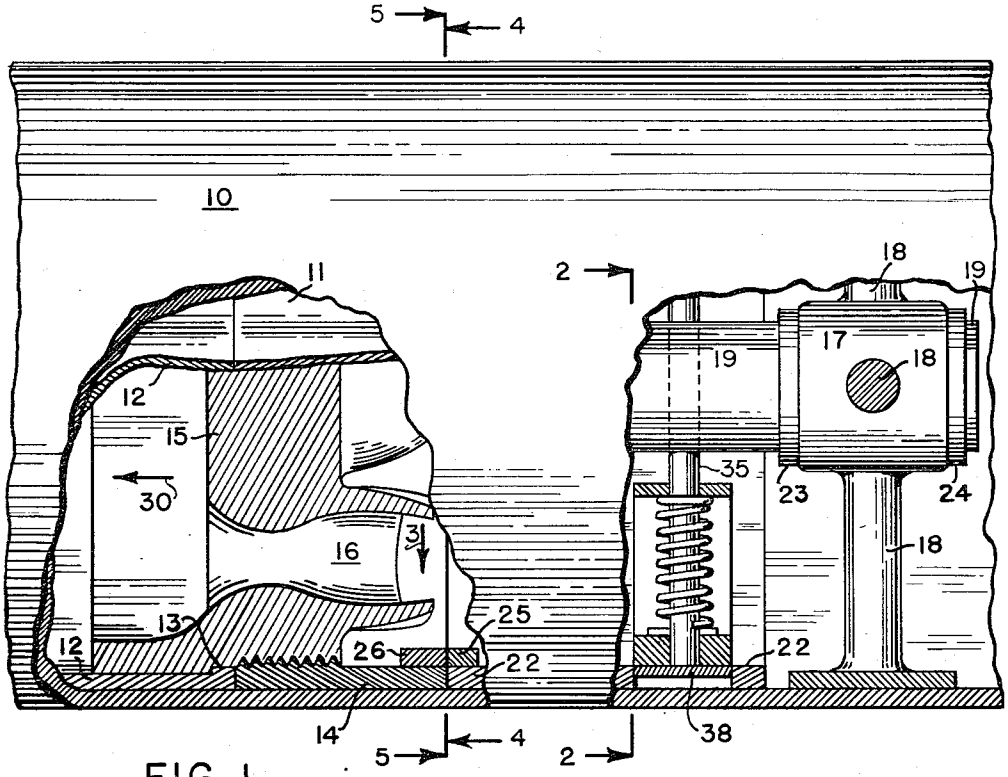


FIG. 1

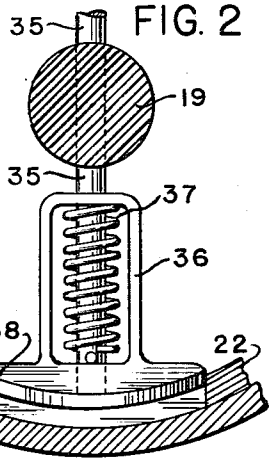


FIG. 2

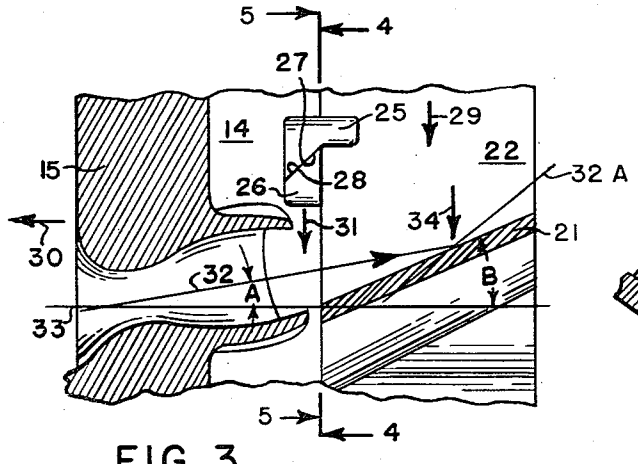


FIG. 3

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FIG. 4

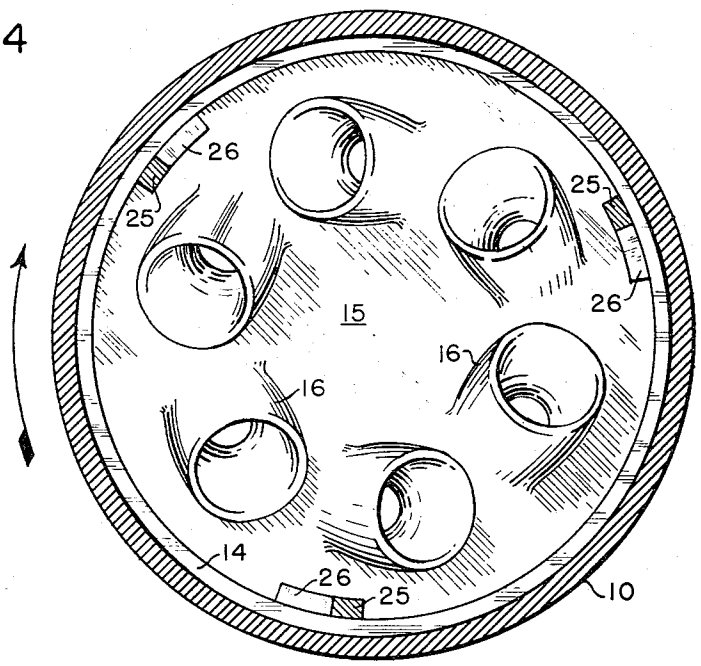
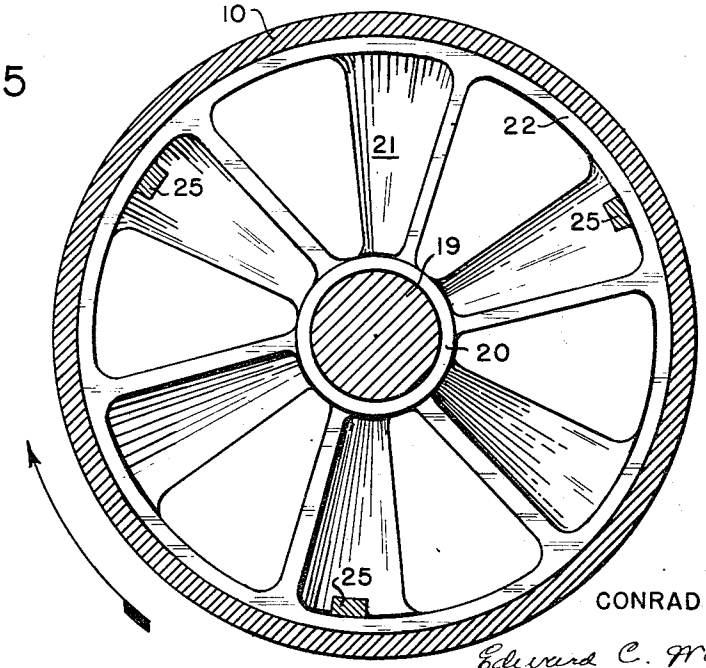


FIG. 5



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PRE-SPIN DEVICE FOR ROCKET LAUNCHER

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4 Claims. (Cl. 89—1.7)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to spin stabilized rockets and more particularly to launching apparatus for imparting pre-spin to the rockets prior to release thereof from the launching apparatus.

In the prior art certain types of rockets have been constructed to spin about their longitudinal axes, which latter is coincident with the trajectory or path of flight, this for the purpose of stabilizing same. The spin is attained by canting the gas discharge nozzles at the rear end of the rocket in such manner to produce torque, acting circumferentially about the rocket axis. In this type of rocket the spin commences upon release within its launching tube and accelerates as it passes through the tube and during at least a portion of its free flight after launching. The forward velocity upon leaving the launching tube is relatively low as is also the rate of spin which factors are not conducive to produce optimum conditions of stability during the initial launching period. This invention improves the stability of the rocket during said initial launching period by increasing the rate of spin thereof.

One of the objects of the invention is to provide a launcher for pre-spinning a spin-stabilized rocket prior to its release along the launcher.

Another object is to automatically release the rocket from a launcher tube for axial movement therealong after it has attained a predetermined rate of spin therein.

Another object is to release the rocket by mechanism actuated by the issuing gaseous products of combustion of the rocket.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

Fig. 1 is a fragmentary side elevation of the rear end of a launching tube, portions being broken away to reveal a portion of a rocket therein, and the pre-spin device which constitutes the subject of the invention;

Fig. 2 is an enlarged section taken on line 2—2, Fig. 1;

Fig. 3 is a fragmentary view of a portion of the internal details of the device as viewed in the direction of arrow 3, Fig. 1;

Fig. 4 is a section taken on line 4—4, Figs. 1 and 3; and

Fig. 5 is a section taken in line 5—5, Figs. 1 and 3.

Referring in detail to the drawing, and particularly Fig. 1, a rocket launcher **10**, illustrated in the form of a tube open at opposite ends thereof, contains a rocket **11**, comprising a tubular wall **12**, to which is secured in any desired manner, such as by flange **13** and threaded sleeve **14**, a wall **15** having a plurality of exhaust nozzles **16**, the axes of the nozzles being canted, as best shown in Figs. 3 and 4 to impart spin to the rocket about its longitudinal axis during flight along the trajectory thereof. The construction so far described is conventional and well known and it will be understood that the rocket may contain any suitable combustible material for propelling same and any suitable ignition means may be employed to ignite the combustible material, these features also being well known and hence omitted from the drawing to simplify the disclosure. The novel features employed in combination with the conventional construction just described will now be set forth in detail.

A bearing **17**, supported in tube **10**, by spider arms **18**, is disposed adjacent the rear end of the tube and supports a rotatable shaft **19**, to which is affixed a hub **20**, carrying a plurality of radially extending vanes **21**, which are affixed at their outer tips to a sleeve **22**, the shaft and vane assembly being rotatable in bearing **17**. Suitable collars **23**, **24** on shaft **19** prevent axial movement of the shaft and vane assembly.

A plurality of angularly spaced lugs **25** are affixed to sleeve **22** and project into sleeve **14**, engaging lugs **26** affixed to sleeve **14**. As best shown in Fig. 3, angular face **27**, on a lug **25**, overlaps angular face **28**, on a lug **26**, and it will be apparent that if a torque be applied to vanes **21** to effect bodily rotation thereof in the direction of arrow **29**, lugs **25** will remain engaged with lugs **26** in the position shown and prevent forward movement of the rocket in the direction of arrow **30**. It will also be apparent that when lugs **26** move in the direction of arrow **31** at a greater angular speed than sleeve **22** in the direction of arrow **29**, the lugs will disengage and the rocket will be free to move forward through the launcher tube in the direction of arrow **30**.

Referring again to Fig. 3, it will be observed that axis **32** of nozzle **16** is disposed at an angle A to line **33**, and that vane **21** is disposed at an angle B to line **33**, angle B being greater than angle A. When gas issues in the direction of axis **32**, it impinges on the vane and is deflected in a direction as indicated by line **32a**, producing a component of force **34**, which tends to rotate the vanes. Due to the greater angle B than angle A, the vanes tend to rotate faster than the rocket, but since they are restrained from doing so by lugs **25**, **26**, it will be apparent that the lugs lock the rocket to the vanes and prevent forward movement of the rocket.

Shaft **19**, rotatable with the vanes, is provided with a pair of diametrically opposed centrifugal braking devices which are identical in construction, the description of one of which will serve for both. Referring to Figs. 1 and 2, shaft **19** is provided with a transverse shaft **35**, upon which slides a braking device **36**, urged radially inwardly by a spring **37**, and outwardly by centrifugal force. The outer surface of the braking device may be provided with high friction braking material **38** to engage the inner surface of the launcher tube.

In operation, the rocket is loaded in the launcher tube with the cooperating lugs in engagement. When the combustible material in the rocket is ignited gas issues from the discharge nozzle **16** and against vanes **21**, one being provided for each nozzle. The vanes and rocket spin due to the cant angle of the vanes and nozzles, but since the cant angle of the vanes is greater than the cant angle of the nozzles the former tends to rotate faster than the latter, maintaining the lugs **25**, **26** in engagement and locking the rocket against forward axial movement through the launcher tube. When a predetermined rate of spin is attained the acceleration of the vanes is checked by the centrifugal brakes engaging the launcher tube and the continued acceleration of the rocket in its spin disengages the lugs and permits the rocket to move forward through the launcher tube. It will thus be apparent that the rocket will attain a predetermined rate of spin before it is released for forward axial movement, and that its initial spin as it leaves the launcher tube will be greater

than would obtain in the absence of the pre-spin mechanism.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understod that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What I claim is:

1. Apparatus for launching a rocket of the type having canted exhaust nozzles through which gas is adapted to issue and produce forces on the rocket to propel it along its longitudinal axis and rotate it about said axis comprising; a launcher tube adapted to contain the rocket, a rotary member disposed within the tube having vane means against which gas issuing from the rocket nozzles may impinge and effect rotation of the member, said member being rotatable in a plane normal to the longitudinal axis of the tube, the cant angle of said vanes being related to the cant angle of the nozzles in such manner that the member tends to rotate in said plane at a speed in excess of the speed of rotation of the rocket, means operative in response to the tendency of said member to rotate at said speed in excess of the speed of rotation of the rocket for locking said member and rocket together for conjoint rotation and for restraining forward axial movement of the rocket along the tube, and means for limiting the speed of rotation of said member to obviate the tendency for it to rotate at a speed in excess of the rocket and to permit the rocket to be released from said member.

2. Apparatus in accordance with claim 1, wherein the means for locking said member and rocket together comprises at least one pair of lugs, one affixed to the member and the other to the rocket, adapted to interlock while the member tends to rotate at a speed in excess of the speed of rotation of the rocket and release when the rocket rotates at a speed in excess of the speed of rotation of said member.

3. Apparatus in accordance with claim 1, wherein said means for releasing the member from the rocket includes a centrifugally actuated device carried by the member.

4. Apparatus in accordance with claim 1, wherein the means for locking said member and rocket together comprises at least one pair of lugs, one affixed to the member and the other to the rocket, adapted to interlock while said member tends to rotate at a speed in excess of the speed of rotation of the rocket and release when the rocket rotates at a speed in excess of the speed of rotation of said member, said means for releasing the member from the rocket including a centrifugally actuated braking device carried by the member.

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