June 12, 1962 W. R. NOYES ETAL 3,038,382

BORE RIDERS FOR LAUNCHING OF PROJECTILES

Filed Sept. 26, 1958

FIG.1.

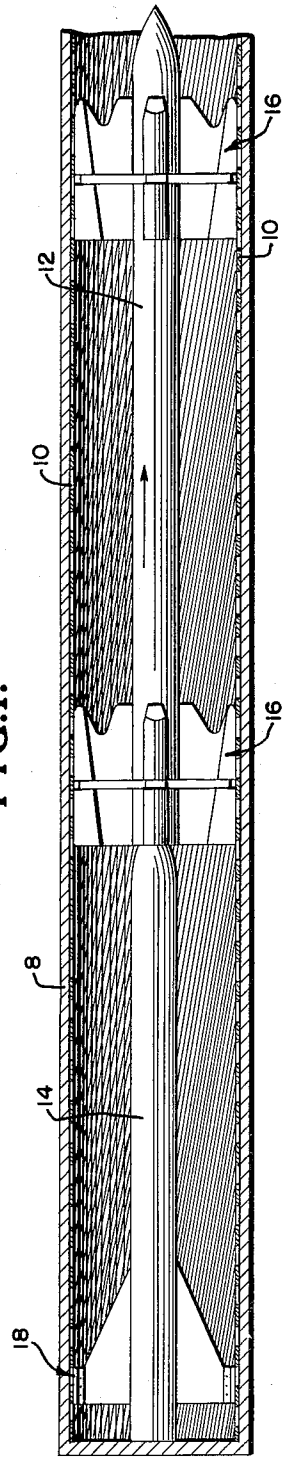


FIG.4.

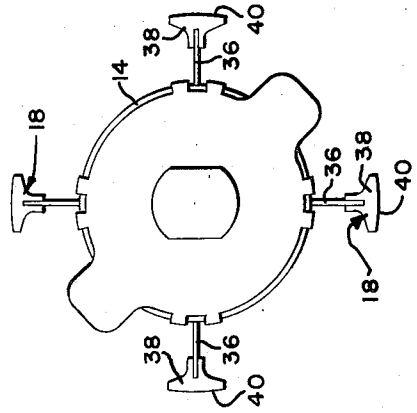


FIG.3.

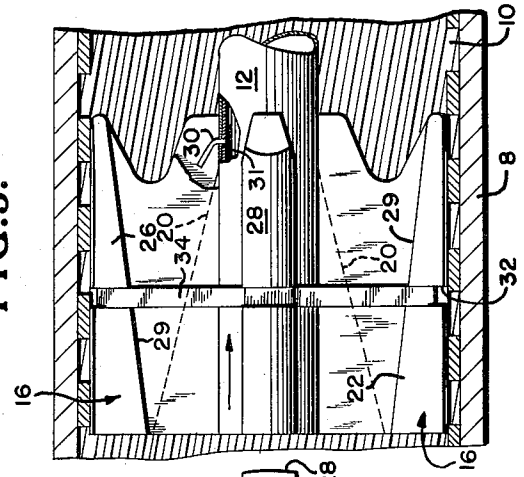
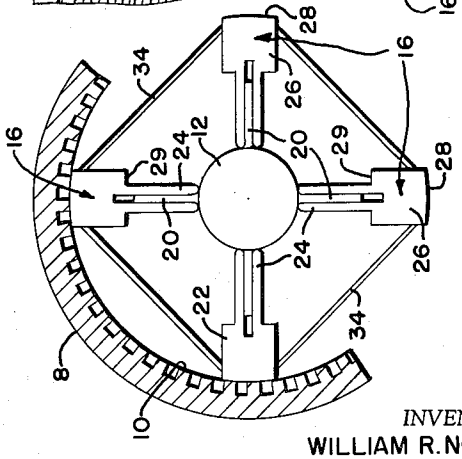


FIG.2.



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BORE RIDERS FOR LAUNCHING OF PROJECTILES

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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 and therefor.

The present invention relates to bore riders to be attached to missiles of the rocket type to enable the missiles to be launched from guns having rifling as well as smooth bore tubes.

Heretofore the launching of self-propelled missiles required special tubes or guns which had risers or tracks along their length for the rockets to ride on. These were part of the launching tube or were inserted in the tube as a separate part. For each size rocket a different tube or separate inserts were needed.

The object of the present invention is to provide a means which can be temporarily attached to a self-propelled missile and which will center said missile in a gun or launching tube and provide riders for engaging the wall of the gun or tube.

It is a further object of the invention to provide a temporary support for a self-propelled missile which can be attached to the missile and remain attached to the missile during its travel in the gun but which will detach itself upon the missile leaving the gun.

It is a still further object of the invention to provide a bore rider to be attached to self-propelled missiles that will ride on the lands of a rifled gun so that a special launching tube is not needed.

It is a still further object to provide adaptor launching means in the form of a bore rider for a self-propelled missile which can be attached to the missile without special fastening devices on the missile and which will automatically detach itself from the missile, thus leaving the missile without encumbrance.

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 drawings wherein:

FIG. 1 is a longitudinal cross section of the missile in a gun;

FIG. 2 is an end view;

FIG. 3 is a side elevation; and

FIG. 4 is an end view of a modified form of bore rider.

Referring particularly to FIGS. 1, 2 and 3, a gun barrel **8** is shown having rifling consisting of spiral lands **10** and spiral grooves **10'**. Inserted in gun barrel **8** is a self-propelled missile **12**, here shown with a booster **14**. The missile is here shown with spaced bore riders **16** while the booster is provided with a single bore rider **18** of a modified form (FIG. 4). Arrow (A) shows the direction of launch.

The booster and its attached bore rider **18** will detach itself from the missile when its fuel is exhausted but the bore riders **16** detach themselves from the missile upon leaving the gun barrel.

Referring particularly to FIGS. 2 and 3, the missile **12** is shown having the usual fins **20**. The adaptor launch means comprise bore riders **16** which are made up of four separate brackets **22** having legs **24** fitting on each

side of the fins **20**. The legs **24** are closely spaced and closely engage the fins **20**, substantially preventing circumferential movement of the brackets relative to fins **20**.

The body portions **26** of brackets **16** have convex surfaces **28** which have longitudinal and circumferential lengths greater than the width of grooves **10'** as clearly shown in FIGURES 1 and 2, whereby, surfaces **28** only engage lands **10** and ride over grooves **10'**. Brackets **16** may be constructed of a plastic or light metal.

The inner surface **29** of the bracket body **26** is inclined with relation to the cylindrical wall of the missile and to the convex surface **28**, which last two surfaces are substantially parallel. This inclined surface serves to detach the bore rider from the missile as will be hereinafter described in greater detail. Each pair of legs **24** forward of the fins carries a pin **30** which is firmly secured to the bracket by molding or cementing for plastic and welded for metal, and fits into a hole **31** in the cylindrical wall of the missile. The pins **30** of the four brackets serve to retain the bore rider while in the gun barrel or launching tube but easily leave the holes **31** under the outward force exerted by the air impinging upon surfaces **29** after clearing the muzzle of the gun.

Midway of the body portion and on the outward side, the convex surface **28** is interrupted by a groove **32**. The groove is adapted to receive a rubber band **34** or other elastic securing means such as a coiled spring to bind the four brackets together to form the bore rider. The elastic band serves to hold the legs **24** securely on the fins until the missile leaves the gun.

The bore rider shown in FIG. 4 is a modified form of the rider of FIG. 3 and is particularly adapted to be used on a booster. On the booster there is no need to provide a self-detaching bore rider as the booster detaches itself from the missile. The fins **36** of the booster **14** have secured to them by adhesive, rivets or other suitable means, shoes **38** each having an outer convex surface **40** similar to surface **28** which serves the same purpose as the surface **28** riding on lands **10** of gun barrel **8** or on the inner surface of a launching tube (not shown).

The bore rider is used by attaching each of the brackets to a fin and fitting the pin **30** into the holes in the missile wall, and then securing all four brackets together by the elastic band **34**. The convex surfaces riding on the inside of the gun hold the missile centralized in the gun and immediately upon the missile leaving the gun or launching tube the air impinging on the inclined surfaces **29** rips the brackets from the fins, pulling the pins **30** from the hobs, the light elastic band breaking under the strain. The bore rider detaches itself almost immediately as it leaves the gun barrel **8** or the respective launching tube.

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

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In combination; a gun having a barrel portion, a self-propelled missile to be launched from said gun, said missile having a plurality of stabilizing fins circumferentially spaced about said missile, said barrel portion having rifling along the interior surface thereof, said rifling consisting of spiral land portions interspaced by spiral groove portions, the inner diameter of said spiral portions being greater than the internal diameter of said spiral land portions, at least two sets of bore riders removably attached to said missile, the outer diameter of said bore riders being equal to the inner diameter of said land portions within selected tolerances, one of said sets of bore riders

including a plurality of separate bracket members, each of said bracket members having a body portion and a pair of legs integrally formed therewith, a separate one of said bracket members being fitted over selected ones of said plurality of stabilizing fins on said missile, said body portion being arcuate and engaging said land portions of said gun to center said missile in said gun, said bracket members being releasably secured to said stabilizing fins whereby said bore riders ride solely on said land portions during launching of said missile from said gun.

2. The combination of claim 1 wherein said at least one set of bore riders further includes rupturable means securing the bracket members of said one set to said missile, and means for automatically rupturing said rupturable means and separating said bracket members from said missile immediately upon the passage of said set of bore riders from said gun barrel during the launching of said missile.

3. The combination of claim 2 wherein said means for automatically rupturing said rupturable means and separating said bracket members from said missile is aerodynamically responsive.

4. The combination of claim 3 wherein said means for automatically rupturing said rupturable means and separating said brackets from said missile is an inclined plane surface integrally formed with said bracket body portion and forming an acute angle with the arcuate portion of said body portion at the leading edge thereof for forcing said body portions outwardly to rupture said rupturable means and separating said bracket members from said stabilizing fins when said missile leaves the barrel portion of said gun.

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