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FINNED PROJECTILE SUPPORT AND GUIDE

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Fig. 1

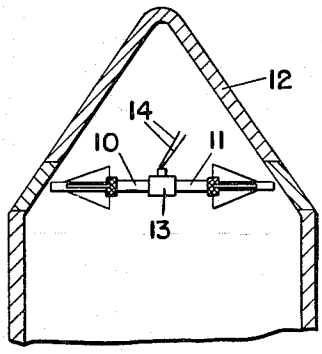


Fig. 2

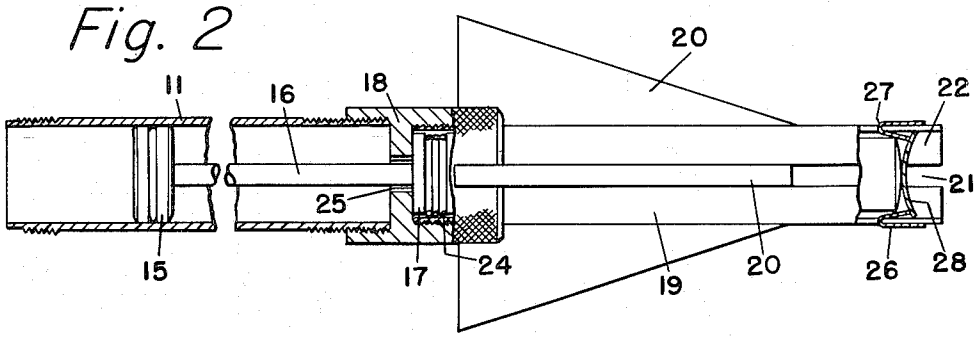
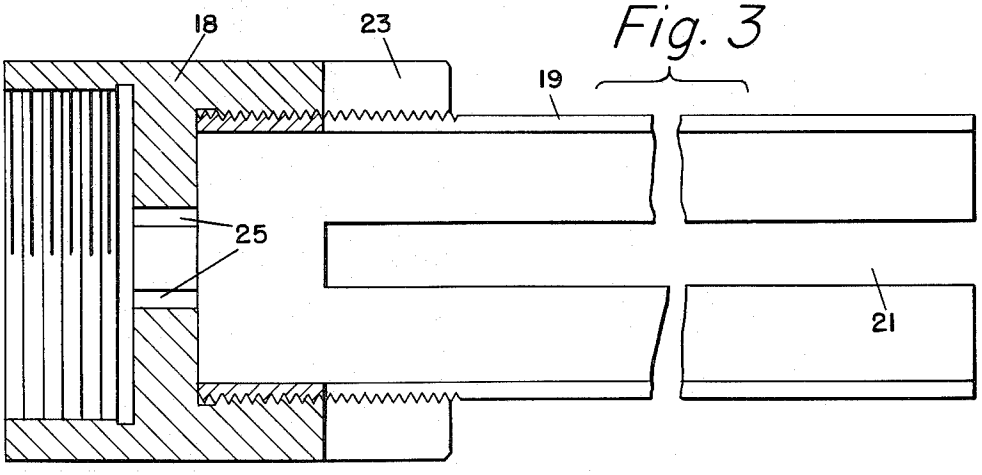


Fig. 3



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FINNED PROJECTILE SUPPORT AND GUIDE

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The invention relates to a support and guide for finned projectiles or decoys to be simultaneously ejected from opposite sides of a missile. An object of this invention is to provide such a support and guide which is of much less weight than is the projectile and which is capable of being attached to a launching tube in a cone of a missile where there is only about an inch clearance between a side of the missile when said projectile is placed between an end of said launching tube and the side wall of the missile. Another object is to provide such a support and guide that does not have to extend around the outside of the finned projectile but may engage the side walls of the fins in guiding.

The finned projectile, its size, weight, and shape were designed for decoy purposes and launching from opposite sides of a missile during flight without having recoil change the missile from its intended path and target, before the present invention. With foregoing clearance and weight limitations the problem of obtaining a suitable support and guide seemed extremely difficult if not hopeless. Nevertheless the task was undertaken.

According to this invention the supporting function was found possible with only a short aluminum adapter longitudinally over-lying part of the existing launching tube and part of the projectile. In combination with such an adapter fixed to a launching tube, a longitudinally slotted guide tube was found to be capable of the desired guiding function when sharing some of the aforementioned supporting function and when the guiding was transferred from the peripheral edges of the fins to the side faces of these fins. In addition a spring, an abutment disc, and retainer ring were found desirable to assist in supporting the projectile without objectionable looseness before being fired or ejected and the provision of such discs of slightly different diameters was found to be a way of increasing the build up of propellant pressure before the launching of the projectile occurred so that velocity of these projectiles could be controlled readily without elaborate weight and space consuming additional elements.

Referring to the drawings:

FIG. 1 is a diagrammatic representation of the opposed launching tubes in the cone of a missile;

FIG. 2 shows the adapter and guide tube around a projectile;

FIG. 3 is an enlarged detail showing the guide tube within the adapter but without the projectile or decoy being shown.

In FIG. 1 is shown the opposed launching tubes **10** and **11** of the prior art to this invention fixedly located in the cone **12** of a missile. Between the tubes **10** and **11** is propellant chamber **13** for moving pistons outwardly in the launching tubes for ejecting projectiles one of which is shown in FIG. 2. The usual propellant is fired by an electric primer through the wires **14**. Two launching tubes are oppositely arranged to fire two decoy finned projectiles laterally so that when the projectiles are of equal size and weight the missile will not be moved from its planned path or target by equal and opposite recoil thrusts. FIG. 2 shows one launching tube **11** having

therein a usual piston **15** and piston rod **16**. Each launching tube is threaded into the propellant chamber **13**.

To support and guide the decoy projectile having fins **20** as it is ejected by the piston rod **16**, an adapter **18** is threaded onto the outside of tube **11** and is of aluminum for the purpose of keeping the supporting and guiding attachments as light in weight as possible. Within the adapter **18** is an enlarged end **17** of the piston rod **16** which is hereinafter referred to as a plunger. As may be seen from FIGS. 2 and 3 an aluminum guide tube **19** is in threaded engagement within the adapter **18** for providing an auxiliary support and guide for the decoy projectile having fins **20**. A principal guiding is achieved by the cooperation of the edge faces of the slots **21** with the side faces of the fins **20**. In the embodiment illustrated there are four fins on the projectile. There are also four slots **21** in the guide tube the side walls of which do an important part of the projectile guiding as it is being ejected by propellant pressure acting on the piston **15**, piston rod **16** and plunger **17**.

FIGS. 2 and 3 show how the adapter **18** is also provided with short slots **23** in prolongation of the slots **21** in the guide tube **19**. In fact no assist in guiding the projectile or decoy by its fins, the long slots in the guide tube are in prolongation of the short slots **23** in the adapter **18** for receiving the rear end portion of fins **20**.

A spring **24** of helical shape is shown in FIG. 2 in cooperation with the plunger and projectile to prevent looseness of the projectile in its holder or combination of adapter **18** and guide tube **19**. A stiff but thin plastic washer (not shown) is placed between the right end of spring **24** in FIG. 2 and the projectile to distribute the pressure applied by the end of spring **24**. A pair of small holes **25** on opposite sides of the piston rod are provided in the partition wall of the adapter to avoid the formation of a gas cushion acting on the piston to slow down its ejection movement and prevent the projectile having as strong an outward movement as desired. On the outside of guide tube **19** is a retainer ring **26** having extensions **27** into the slots **21** and extending forwardly of the projectile. These extensions **27** serve as abutments for the disc **28** along the forward end of the projectile as shown in FIG. 2. Increasing the diameter of the stiff steel abutment disc **28** has the effect of moving the outer portions **22** of the guide tube **19** which are at the front end of guide tube, radially outward a slight amount providing a taper on outer ends which slope rearwardly when the disc is larger in diameter. By causing a greater stress to be placed in the ring **26** the build up pressure of propellant needed to eject the projectile may be increased to give the projectile a higher velocity. This increased tension in ring **26** is obtainable in several ways. The ring may be wider (longitudinally of the projectile) to cause engagement of the ring by the fins before the front end of the projectile contacts disc **28** and thus move the ring up the incline under pressure placing the desired tension in ring **26**, before the front end of the projectile contacts disc **28** and moves it out of the way. Another way of increasing projectile velocity is to increase the thickness of disc **28** alone giving it less resiliency and preferably with a sharper peripheral edge which will cut into the softer aluminum guide tube and make an abutment requiring greater propellant pressure to push the disc **28** out of tube **19**. Either or both of these means may be used. The forward end of the projectile usually moves disc **28** out of the tube. Where greater pressure build up is desired the disc **28** is placed far enough in front of the forward end of the projectile to allow the motion of the projectile to push the retainer ring up its incline for obtaining this larger pressure build up. This ring may rupture in tension before the extensions **27** contact the disc **28** or else the upward movement of disc **26** may be

no more than enough to obtain the desired pressure when the extensions 27 push the disc 28 before the projectile does. A wider retainer ring enables this ring to be moved by the fins pushing it up any incline created by a larger diameter disc 28 for requiring the desired propellant pressure before the ring 26 ruptures or before the disc 28 is pushed out of place. Extensions 27 may not be provided on the ring 26 but may be used when desired. When disc 28 is pushed by the projectile, its rounded front end will engage the center of disc 28. Application of stress to the center of this disc will tend to flex it more than a stress applied by extensions 27 to an outer edge portion of the same disc, depending of course upon its thickness.

Among the advantages of this invention may be mentioned the absence of any larger diameter outside guide for the projectile fins. Instead the projectile is guided on ejection by the side faces of the fins engaging the side walls of the slots in both the adapter and guide tube. The combined weight of the plunger 17, adapter 18, spring 24, guide tube 19, retainer ring 26 and disc 28 is between about one third and one fourth the weight of the finned decoy projectile. The additional space required for the support and guide functions for the projectile is but a small minor fraction of the projectile length beyond the front end of launching tube or about one inch. This distance is shown in FIG. 2 as being from the rear end of the fins backward to the front end of the launching tube 11. Simple means are thus provided whereby the velocity of the decoy projectile may be increased or decreased.

I claim:

1. In a missile cone having opposed pressure launching cylinders with pistons and piston rods for simultaneous ejection of finned projectiles in opposite directions laterally from a missile, the combination therewith of the improvement for retaining a projectile fixed with respect to its launching cylinder prior to its ejection and for guiding a finned projectile on launching, said improvement being also of less diameter than that of the fins, of lighter weight than said projectile, not much longer than

said projectile, and comprising an adapter tube secured over an end of a launching cylinder, a longitudinally slotted guide tube secured to said adapter, the slots in said guide tube extending over a major portion of its length and in alignment with slots in said adapter extending for but a minor part of the length of the adapter, the slots in said guide tube and adapter being of a width to receive and guide the projectile fins, a helical spring within said adapter for cooperation with a rear end of said projectile and with an end portion of said piston rod, a retainer ring slidable on an outer end portion of said guide tube, and an abutment disc for insertion in the front end of said guide tube contiguous said projectile, of a harder material than said guide tube, the diameter of said disc being adapted to expand the fore end of said guide tube, whereby the diameter of said abutment disc and position of said retainer ring in clamping said disc will determine the degree of pressure build up in the launching cylinder for ejection of said projectile.

2. An apparatus according to claim 1 in which the front end of said piston rod is provided with an enlargement against which said helical spring may press, and said retainer ring being provided on its rear edge with extensions entering the slots in said guide tube and projecting forwardly into contact with said disc.

3. The combination with an adapter tube for attachment over a front end of a pressure launching tube for a finned projectile when said adapter and launching tube are of less diameter than said projectile fins, a guide tube for a finned projectile for threaded attachment to said adapter and longitudinally slotted through which projectile fins may extend and be guided by the side edges of the guide tube slots on ejection of such a projectile, a retainer ring slidable over said guide tube front end portion, and an abutment disc of a size to expand the fore end of said slotted guide tube, whereby said ring may clamp the disc in said guide tube by pressure of said guide tube fore end upon the edge of said disc.

No references cited.