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RING DECOY LAUNCHING MECHANISM

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Fig. 1

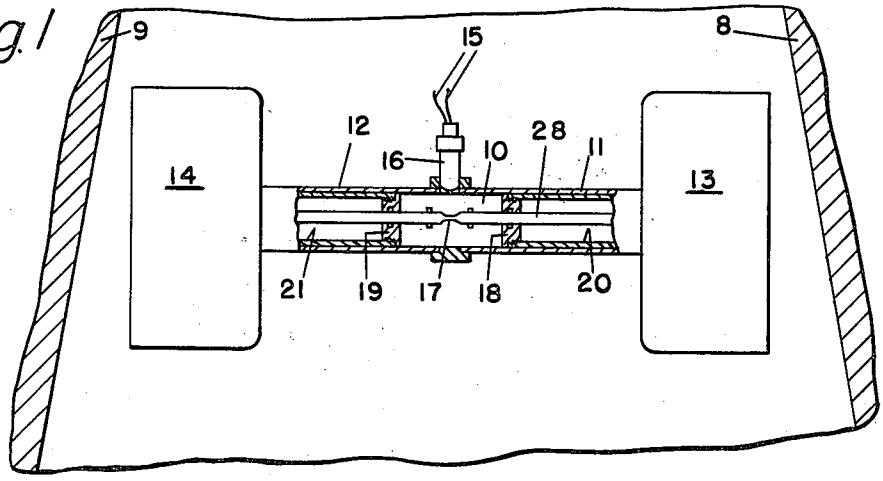
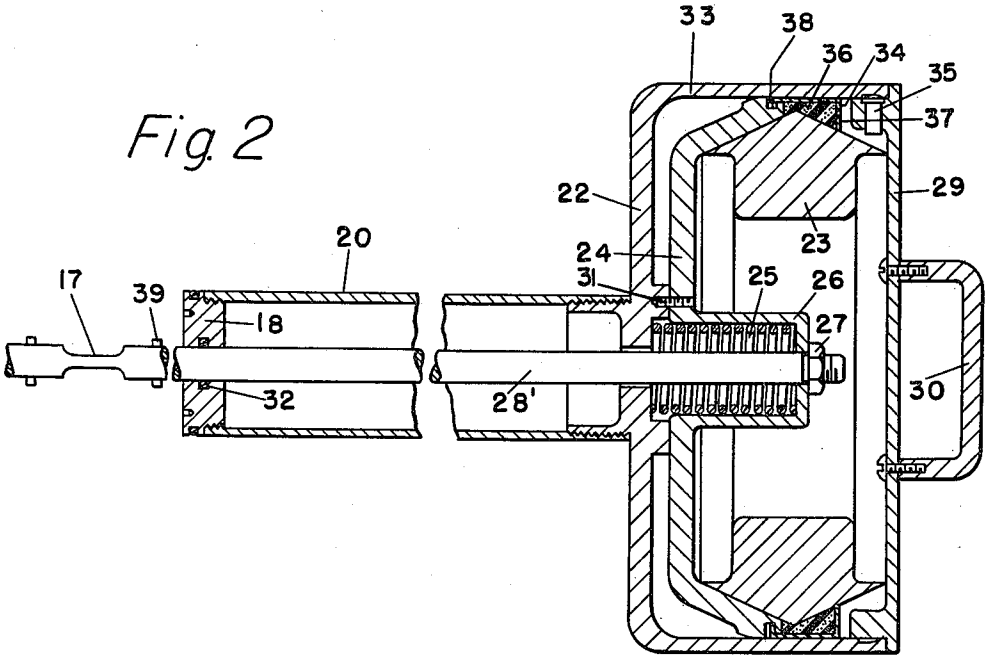


Fig. 2



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RING DECOY LAUNCHING MECHANISM

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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 us of any royalty thereon.

This invention relates to a means for supporting and guiding decoy ring projectiles when launched in opposite directions from a missile. An object is to provide lightweight supporting and guiding means for such a decoy projectile when its periphery is oppositely tapered, when the weight of such supporting and guiding means must be but a fraction of the weight of the decoy projectile and when the permissible space longitudinally of the launching cylinders is extremely limited.

The shape of the projectile has required any supporting and guiding means to be unique in both function and construction. The requirements for such guiding means had to be so cramped for space and light in weight as to have complicated any solution.

According to this invention pressure build up in the opposite launching cylinders has been attained to get high velocity of the ejected projectiles in a short travel by use of a frangible connection. A piston and tube of smaller diameter than each projectile is used to economize space, conserve efficiency, and avoid a need for bulky guide means for the ring projectile. A piston in the launching cylinder moves a projectile holder forward after the initial pressure build up and rupture of said frangible connection. In order to gain added velocity for this ring projectile being ejected, as soon as rupture of the frangible connection occurs, a spring under pressure is released to give the projectile an added impulse above that supplied by said piston and launching cylinder.

FIG. 1 is a view partly in section showing usual opposed launching cylinders ready to fire the decoy projectiles in opposite directions with the housings.

FIG. 2 is a longitudinal section through only one of the guide cylinders which slide within a launching cylinder for ejecting the decoy projectile.

As shown in FIG. 1 a usual propellant chamber **10** is placed between opposed launching cylinders **11** and **12** for ejecting decoy projectiles carried on the supporting and guiding body holders **13** and **14** one of which is shown more in detail in FIG. 2. Electric wires **15** enter a primer housing **16** for firing the primer which in turn ignites the propellant in chamber **10** creating pressure for moving heads or pistons **18** and **19** after rupture of a frangible coupling **17**. Within the launching cylinders **11** and **12** are the pistons **18** and **19** adapted to be moved outward under propellant pressure. Connected to these pistons **18** and **19** are the tubular supporting guides **20** and **21** slidably fitting within the cylinders **11** and **12** for supporting and guiding outward movement of the bodies **13** and **14** in which are received the holders for the decoy projectiles as is shown in FIG. 2.

In this FIG. 2 the body **22** is shown as threaded within the supporting tube **20** and enclosing the ring type decoy projectile **23** all around it and on one side. Within the body **22** is an auxiliary holder and guide **24** directly engaging the projectile **23**. A helical spring **25** enclosed within housing **26** is compressed by a nut **27** on rod **28** and so held until rupture of coupling **17** had occurred. Prior to installation of the projectile in a missile having its cone represented by the inclined lines **8** and **9** in FIG. 1, a cover **29** is provided to assist in retaining the projectile **23** in place in holder **24** and body **22**. This cover may be held in place by one or more pins **35** frictionally or positively engaging a slightly recessed portion in the forward end portion of sides of holder **22**. The holder **24** has a freely sliding fit within the inside of the side walls **33** of the cup shaped body **22**. The resilient clamps **34** of which there are at least three, each of them includes a wedge shaped resilient pad **36** of foam rubber compressed between the tapered periphery of the projectile and a metal angle piece **34** having inwardly bent sides, one on the outer side **37** of the pad **36** and the other bent side **38** being shorter and received within a groove shown on the periphery of the holder **24**. Before inserting the projectile **23** in place the cover **29** is removed by its handle **30**. Screws **31** which had been inserted for joining holder **24** to body **22** are removed to allow separation of the projectile **23**, holder **24** and body **22** after firing.

In operation on closing a primer circuit **15** and firing the primer in housing **16**, the propellant in chamber **10** is ignited creating gas pressure acting on the pistons **18** and **19** within the launching cylinders **11** and **12** and moving those pistons in opposite directions after rupture of the frangible coupling **17**. As the pistons move outwardly the supporting and guiding tubes **20** and **21** for the projectiles move with their pistons and are guided by the outer launching cylinders **11** and **12**. Referring to FIG. 2 the cover **29** has been removed and retaining screws **31** holding the body **22** and holder together have been removed, and the nut **27** has been tightened to compress spring **25**. The clamps **36** have been previously inserted. After piston **18** and tube **20** start moving under propellant pressure, upon rupture of coupling **17**, the spring **25** immediately expands pushing holder **24** and decoy projectile **23** ahead of the movement of holder **22** with perhaps an acceleration of about 5 feet per second faster than that of the body **22** and tube **20**, depending on the strength of spring **25**. As the tube **20** and body **22** are moved initially the holder **24** and projectile **23** likewise move outward during elongation of coupling **17** and before its fracture. After fracture the propellant pressure has built up to a value sufficient for moving the piston **18** and what it is connected to a more rapid rate while the body **22** is being moved outwardly under the built up propellant pressure the spring **25** is pressing against body **22** and moving the holder **24** and projectile **23** more rapidly outward. Movement of holder **24** at a faster rate than body **22** continues until pin **39** through rod **28** abuts the piston **18** and cutting short the additional impulse given the projectile over and above that due to body **22**. By or before that cutting off of additional movement to holder **24** and projectile **23** has been reached the projectile will have been released from the holder **24** and body **22** and moved clear of the outer edge of the wall **33**. When the decoy projectile has been moved that far the clamps **34** fly radially outward to be free of the compression in the rubber **36**, moving the short side or flange **38** out of the groove in the holder **24** in which it is placed and in this same manner each of the 3 or more clamps are removed due largely to a release of pressure on them. The decoy projectile continues its flight ahead of the clamps, holder, and body, and this group of elements with tube **20**, rod **28** and piston may continue its outward movement until free of the launcher cylinder when it will fall away from the missile.

Among the advantages of this invention may be mentioned the imparting of a suitable velocity to the decoy projectile **23** depending upon the degree of pressure build up before the rapid acceleration of the parts begins after rupture of the coupling **17**. Thus initial build up of pressure depends on the combustion rate of the propellant and upon the size of the frangible coupling and its ultimate strength before rupture of such coupling. The velocity

imparted to the projectile is about 45 feet per second and this is accomplished by the attachment shown in FIG. 2 which enables the ring projectile to be supported and guided during ejection with little clearance space between and longitudinally of the launching cylinder and axial depth of the projectile and the side of the missile cone through which it is launched. This 16½ pound decoy projectile is thus enabled to be satisfactorily sped on its mission by means of the existing launching cylinders with less additional weight for the supporting and guiding attachment that is the weight of the decoy projectile. The tube **20**, and parts **22**, **24** and **28** are made of aluminum for lightness in weight. The thrust given the projectile in addition to that imparted by the piston **18** and tube **20** is axial of the tube and projectile. The piston and tube **20** move only about ¼ of an inch before rupture of coupling **17** occurs when sprping **25** begins imparting the additional thrust mentioned for the ring projectile **23**.

The total movement of the projectile while gaining its desired velocity is only about 4 inches before its release. The existing launching cylinders have to support and guide the projectile during its ejection. As shown in FIG. 1 each body **22** abuts the launching cylinder **11** prior to firing the propellant. An O ring packing **32** is provided in piston **18** to reduce leakage around rod **28**. To assemble the pistons **18** and **19** with their guides **20** and **21** with frangible coupling **17**, at least one of the bodies **22** must be unscrewed from its guide tube to allow the two guide tubes, pistons and rods to be inserted with coupling **17** between them from outside of one of the launching cylinders. Besides supporting and guiding a projectile, tube **20** functions as part of an applicator to transfer thrust from piston **18** to the body **22**, and the holder **24** functions as a second load applicator. In the walls **8** and **9** of the cone opposite the holders **13** and **14** are removable doors forming no part of this invention but which are removable on or before firing the decoys in order that the launching of such decoys may not be impeded.

We claim:

1. A combination comprising a launching cylinder, a piston therein, a propellant chamber, connected to said cylinder for actuating said piston on ignition of propellant, means for igniting said propellant, a load applicator connected to said piston for imparting a thrust to a load from said piston through said applicator, and means for imparting an additional thrust to a load, said last mentioned means comprising a second load applicator between a load and the first mentioned applicator, a rod extending through said piston for movement with initial movement of said piston and applicators under propellant pressure, a frangible coupling to said rod for resisting said initial movement of said piston and applicator under propellant pressure, and a spring between said first and second mentioned load applicator for imparting an additional thrust on the second load applicator after rupture of said frangible coupling, whereby said additional thrust may vary with the strength of said spring and be applied to a load during movement of said first mentioned applicator.

2. A combination according to claim 1 in which an abutment on the rod limits its movement under influence of said spring.

3. In a missile having a nose cone, opposed pressure cyinders for firing decoy projectiles out of said cone and

launching cylinders in opposite directions and simultaneously when under substantially equal impulses and of substantially equal weights to avoid any recoil being unbalanced and in danger of throwing said missile off its intended course, the combination therewith of the improvement for supporting and guiding said decoy projectiles when of ring shape and each having substantially equal and oppositely tapered peripheral portions, said improvement including for each decoy projectile a supporting and guiding tube slidable in each launching cylinder, a head closing the inner end portion of each such tube, a cup shaped body threaded to each tube outer end portion, a cup shaped holder slidable within each body portion, a helical spring axially within said body and holder, for cooperation with each, a rod axially through each of said tunes for holding its spring compressed, a frangible connection between said rods and within said launching cylinders, an abutment pin through each rod between said frangible connection and the head of each tube, an inner side wall of said holder being tapered to receive the taper on one half portion of the decoy projectile ring periphery, a plurality of substantially equally angularly spaced resilient clamps held to said holder and compressed between a side portion of said body and an outer tapered portion of the projectile periphery, whereby on firing an explosive charge between said launching cylinders the pressure on each tube head moves the tubes outwardly until said connection ruptures, when each spring pushes each decoy projectile outwardly faster than the outward movement of said cup shaped body which supports and guides the outward movement of its decoy projectile and its holder until said abutment pin engages its tube head and limits outward movement of said holder for separation of said decoy projectile therefrom and the radial outward movement of said clamps upon release of their compression leaves the projectile itself free of any launching attachment parts.

4. An attachment for a launching cylinder in a missile cone whereby a decoy ring type projectile of much larger diameter than said cylinder may be supported and guided by said cylinder while being ejected thereby, said attachment comprising a supporting and guiding tube for said projectile slidable within said cylinder, a head or piston closing an inner end of said tube, a cup shaped body secured, to the outer end of said tube and facing outward, a cup shaped holder of less depth than said body and slidable within the body side walls for holding a ring type projectile, said holder being clamped to said body before beginning of an outward movement by said tube and body, a rod secured to said holder and extending through said tube and piston to a frangible coupling, a spring between said holder and body for imparting an additional impulse to said projectile and holder after rupture of said coupling, a resilient clamp for a tapered periphery of a projectile, and an abutment on said rod for engagement with said piston to limit outward movement of said holder under impulse of said spring.

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