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COMPRESSED AIR ROCKET PROPELLING DEVICE

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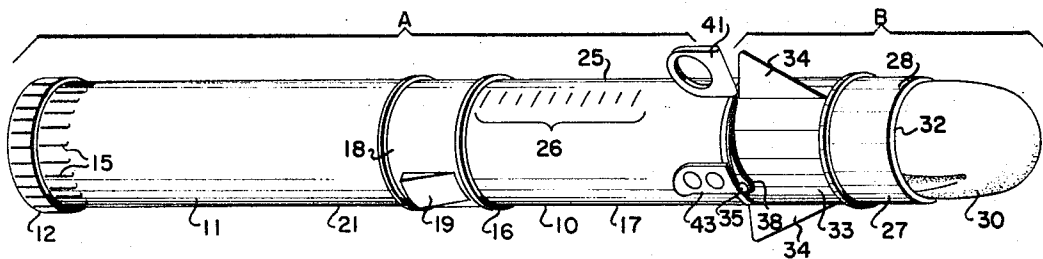


FIG. 1

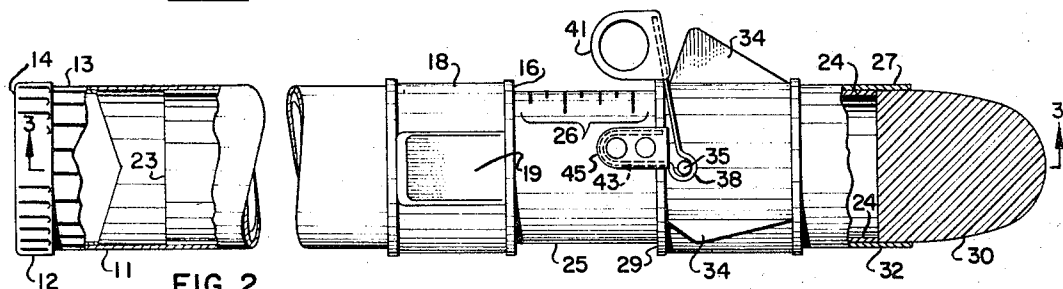


FIG. 2

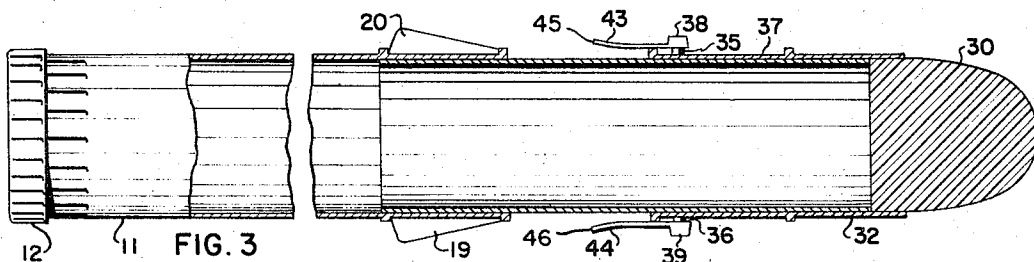


FIG. 3

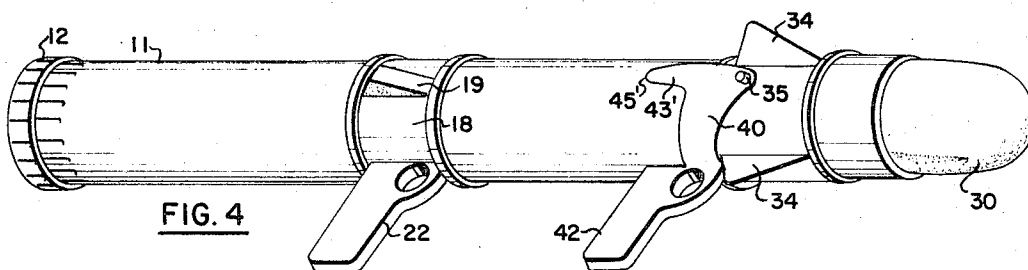


FIG. 4

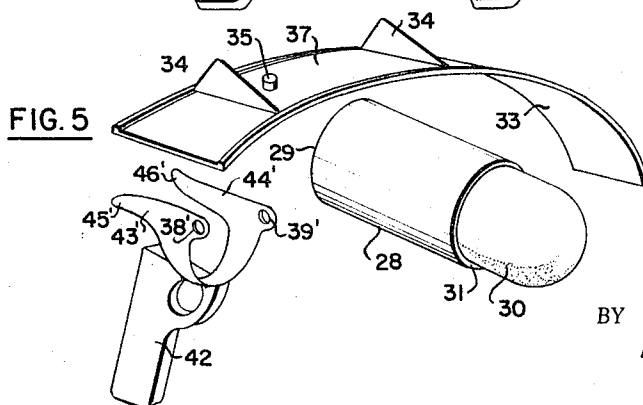


FIG. 5

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COMPRESSED AIR ROCKET PROPELLING DEVICE
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This invention relates to toys and more particularly to devices designed to propel a projectile in a controlled manner.

As is usual in the toy business, play implements for children tend to parallel technological advances in industry. Witness for example common recreational items such as toy trains, toy automobiles, toy guns, etc. Experience has shown that as the actual article itself improves in manufacture, its simulated counterpart is likewise refined, thereby making the toys appear more and more life-like. The instant invention is directed to a toy rocket designed to imitate a real rocket both in appearance and flight.

In view of the present world emphasis on rocketry in all its phases, it may be readily appreciated that there are literally hundreds of toy rockets of all descriptions and natures. Prior art devices have used springs, rubber bands and even explosive chemicals to provide the impetus required for toy rocket flight. Other devices in wide use simply simulate a rocket in appearance and make no provision for flight.

The instant invention presents a device offering many improvements over prior art toys and sets forth refinements in use and operation never before attainable. Compressed air is utilized as the propellant with provisions incorporated directly into the body design for producing the required pressure. In such a manner, problems arising from breakage of springs and rubber bands in prior art devices are entirely avoided. Further, the obvious dangers attendant with the employment explosive propellants for simulated flight are completely eliminated.

Coupled with extreme simplicity in construction and manufacture, the instant toy rocket is equipped with advancements in safety and function. Expensive, intricate parts are not required and a built-in, functional, range finder adds greatly to the enjoyment and utility of the toy.

It is therefore an object of this invention to provide a toy rocket capable of generating its own supply of compressed air sufficient for efficient operation.

It is another object of this invention to provide a toy rocket featuring safety in construction and operation for use by children without fear of injury.

It is another object of this invention to provide a toy rocket having universal application either as a simulated space vehicle or as a simulated hand fired weapon.

It is another object of this invention to provide a toy rocket constructed with a minimum number of operating parts.

It is another object of this invention to provide a toy rocket incorporating means to simply and accurately determine the distance of flight.

It is another object of this invention to provide a toy rocket featuring a novel projectile releasing mechanism including a cam operated firing yoke.

It is another object of this invention to provide a toy rocket construction featuring telescoping operating cylinders.

It is a further object of this invention to provide a toy rocket that is inexpensive in manufacture, simple in construction and trouble free in operation.

Other objects and a fuller understanding of the invention will be had by referring to the following description and claims of a preferred embodiment thereof, taken in conjunction with the accompanying drawings wherein like

reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a perspective view of a toy rocket suitable for operation with a firing tripod.

FIG. 2 is a side elevational view of a toy rocket partially broken away to show interior construction.

FIG. 3 is a cross section taken along line 3-3 of FIG. 2.

FIG. 4 is a perspective view of a modified toy rocket.

FIG. 5 is an exploded view of projectile details.

Although specific terms are used in the following description for the sake of clarity, these terms are intended to refer only to the particular structure of my invention selected for illustration in the drawings and are not intended to define or limit the scope of the invention.

Referring now to FIG. 1 wherein a toy rocket 10 designed in accordance with the instant invention is set forth, the device consists principally of a launching assembly generally designated A and a projectile assembly generally designated B. As hereinafter more fully described in detail, launching assembly A comprises means for compressing the air required for performance of the toy rocket while projectile assembly B includes projectile releasing means in addition to the projectile itself.

Cylindrical base tube 11 may be formed of tubular metal, cardboard or plastic as desired of any diameter convenient for the intended use. In the interest of simplicity in manufacture, cylindrical end cap 12 is cemented, stapled or otherwise fastened to base end 13 of tube 11 to form a substantially air tight end closure 14. End cap 12 may be decoratively formed or cast with tubular projections 15 to simulate a plurality of gas passages. Operating end 16 of base tube 11 is completely open to receive firing tube 17 in substantially airtight, telescoping arrangement. Cam collar 18 of sufficient width to contain cams 19, 20 encircles base tube 11 at operating end 16 and terminates flush with said end. A pair of forwardly inclined cams 19, 20, diametrically opposed, extend above cam collar 18 and may be integrally formed therewith. Cam collar 18 is cemented or otherwise securely bonded to outer surface 21 of base tube 11. As shown in FIG. 5, firing grip 22 may also be formed with collar 18 when it is desired to simulate a bazooka type weapon. If desired, cam collar 18 may be constructed of conical shape of same forward inclination as cams 19, 20. By providing a conical cam surface instead of individual cams 19, 20, there is no possibility of the tips 45, 46 missing the cams because of a rotating action when pulling back on pull 41.

Cylindrical firing tube 17 telescopes within base tube 11 and slides in a substantially air tight circumferential engagement. Base end 23 and projectile end 24 of tube 17 are both completely open to permit unrestricted flow of air through firing tube 17 which acts as an air conduit. Closure of projectile end 24 is accomplished by projectile assembly B as hereinafter more fully set forth. Outer barrel 25 of firing tube 17 normally exposed between cam collar 18 on base tube 11 and projectile assembly B may be imprinted with a plurality of equidistant range markings 26 so arranged as to regulate the relative distance between base end 23 of firing tube and end closure 14 of base tube 11.

Generally speaking, the distance projectile 17 may be propelled by the toy is a function of both the volume of air compressed in tubes 11 and 17 and the speed with which the instrument is operated. With a minimum amount of practice, the operator can develop a technique that will result in uniform operating speed no matter what range is contemplated. It is thus seen that with slight training, the range of the toy can be accurately governed entirely by the quantity of air compressed by

the tubes. By permitting a greater volume of air to be compressed prior to releasing projectile 27, higher pressures build up resulting in greater propelling force of compressed air and thus in greater range of the toy. It is thus seen that by aligning the various range markings 26 with the base tube operating end 16, varying quantities of air may be entrapped within the tubes 11, 17. As more markings are exposed, the total volume within the tubes increases and thus the range increases. As less markings are initially exposed by telescoping the tubes prior to firing, the total volume of entrapped air decreases and the range decreases. Upon practice in manipulating the toy, the operator will be able to range the distance the projectile will fly from the number of markings initially exposed prior to firing. Inasmuch as the distance of projectile travel will vary from operator to operator, the markings 26 cannot be pre-calibrated accurately for all users.

Projectile assembly B comprises a relatively short tubular body 28 of diameter sufficient to provide a press fit of operating end 29 over projectile end 24 of firing tube 17. Head 30 constructed of foam plastic or other soft, light-weight material in the interest of safety to children extends into open end 31 of tubular body 28 and is well cemented about the entire area of peripheral contact to provide front end closure for the toy in an air resistant joint 32. Cylindrical collar 33 of plastic or lightweight sheet metal may be cemented or otherwise strongly attached about body 28 near open operating end 29. A plurality of raised fins 34 extend outwardly perpendicular to collar 33 and are spaced equidistantly about the periphery thereof to provide stability in flight. Oppositely disposed lugs 35, 36, integrally formed with collar 33 extend above surface 37 a distance sufficient to receive ears 38, 39 of firing yoke 40 and of height sufficient to release ears 38, 39 upon operation of cams 19, 20.

Firing yoke 40 may be constructed of bent wire with finger pull ring 41 as shown in FIG. 1 or may be constructed of plastic or sheet metal with hand grip 42 as seen in FIGS. 4 and 5. Yoke 40 is bent generally circular in shape to conform to outer configuration of cylindrical body 28 terminating at outer reaches of yoke in lug engaging ears 38, 39. Cam engaging arms 43, 44 extend rearwardly from respective ears 38, 39 and have trailing tips 45, 46 bent slightly outwardly from firing tube body 17 to permit ready engagement of arms 43, 44 upon respective cams 19, 20. In FIGS. 4 and 5, the cam engaging arms 43', 44' extend rearwardly from their respective ears 38', 39', and have their trailing tips 45', 46' bent slightly outwardly from the firing tube body 17 to permit ready engagement of the arms 43', 44', upon the respective cams 19, 20.

When it is desired to use the toy rocket as a motor device, a bipod stand (not shown) of any conventional design may be affixed to base tube 11 to elevate operating end 16 above the ground in well known manner. In such an arrangement, the pull ring 41 type of firing yoke 40 is utilized. When it is desired to use the toy rocket as a bazooka type device, it is normally elevated to the shoulder of the user with firing and base tubes 17, 11 parallel with or aimed above the surface of the earth (not shown). In such an arrangement, the hand grip 42 type of firing yoke 40 is utilized, serving the dual purpose of providing a handle as well as an operating pull.

In order to use my invention, the firing tube 17 is inserted within base tube 11 a sufficient distance to expose range indicator 26 above operating end 16 of base tube 11. Projectile assembly B may then be pulled over outer barrel 25 of firing tube 17 until projectile end 24 bottoms against head 30 forming a substantially air resistant closure and ears 38, 39 are aligned with cams 19, 20.

Firing tube 17 may then be telescoped within base tube 11 to the desired range as shown upon the portion of range indicator 26 exposed above operating end 16 of base tube 11. With the desired range set, finger pull ring

41 or hand grip 42, as the case may be, is pulled quickly rearwardly thus compressing the volume of air entrapped in the tubes 11, 17 between end cap 12 and head 30. As the tubes are telescoped, air pressure within the tubes increases due to the decreasing available interior volume. Arms 43, 44 ride up upon cams 19, 20 a distance sufficient to permit ears 38, 39 to clear lugs 35, 36. Once lugs 35, 36 are free, projectile 27 is then propelled through the air by the force of the compressed air within the tubes.

It may be readily appreciated that since the device in question is a toy and not a finished scientific instrument, considerable air leakage may occur between the tubes and at the projectile at time of firing. However, such leakage is not significant and will not unduly impair the efficiency of the toy so long as the firing motion of the user is rapid enough to compress air in the tubes at a rate considerably in excess of the leakage.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. In a toy rocket, the combination of a base tube, a firing tube telescoping within said base tube in substantially air-tight sliding engagement, and a projectile body removably attached over projectile end of said firing tube in substantially air-tight sliding engagement; said base tube comprising a relatively long cylindrical, hollow body providing base end and operating end said base end closed in an air-tight end cap and said operating end being open to receive firing tube; said firing tube comprising a relatively long cylindrical, hollow body of diameter to slide within said base tube, providing open base end and open projectile end; said projectile body comprising a hollow cylindrical body of diameter to slide over said open projectile end of firing tube providing open firing tube end and front end closed in a substantially air-tight circumferential joint by a light weight head; a finned cylindrical collar encircling said projectile body and cemented thereto near said open end supporting a plurality of circumferentially spaced fins projecting perpendicularly from said collar; a cylindrical cam collar encircling said base tube and cemented thereto at operating end and supporting a plurality of operating cams in spaced relation about the periphery of said collar; operating means detachably engaging a plurality of peripherally spaced means on said finned collar for manual retraction of said firing tube into telescoping relation with said base tube, said operating means contacting said operating cams after substantial telescoping movement of said firing tube within said base tube to disengage said operating means from said finned collar whereby a volume of air may be compressed within said tubes and the energy contained by said compressed air may be utilized to propel said projectile.

2. The invention of claim 1 wherein said peripherally spaced means comprise a pair of fixed lugs extending above the surface of said finned collar and affixed thereto, said lugs being diametrically opposed on said collar.

3. The invention of claim 1 wherein said peripherally spaced means comprise a pair of fixed lugs extending above the surface of said finned collar and affixed thereto, said lugs being diametrically opposed on said collar and said operating means comprising a semi-circular operating yoke provided with a pair of spaced ears, said ears releasably engaging said lugs.

4. The invention of claim 1 wherein said peripherally spaced means include a pair of fixed lugs extending above surface of said finned collar and affixed thereto, said lugs being diametrically opposed on said collar, said operating means comprising a semi-circular yoke provided with a pair of spaced ears, said ears releasably engaging said lugs, said yoke supporting a pair of cam engaging wings

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extending rearwardly above said firing tube and operating grip.

5. The invention of claim 4 wherein said cam engaging means are bent outwardly from the outer periphery of said firing tube.

6. The invention of claim 1 wherein said cams are diametrically spaced on said collar.

7. The invention of claim 1 wherein, said cams are diametrically spaced on said collar and said cams being inclined in relation to the side walls of said base tube.

8. The invention of claim 1 wherein, said cams are diametrically spaced on said collar and said cams being inclined in relation to the side walls of said base tube, said cams inclined forwardly to receive a portion of said operating means.

9. In a toy rocket, the combination of a base tube, a firing tube telescoping within said base tube in substantially air-tight sliding engagement, and a projectile removably attached over the projectile end of said firing tube in substantially air-tight sliding engagement; said base tube comprising a relatively long cylindrical, hollow body providing base end and operating end, said base end closed in an air-tight end cap and said operating end being open to receive said firing tube; said firing tube comprising a relatively long cylindrical, hollow body of diameter to slide within said base tube, providing open base end and open projectile end; said projectile comprising a hollow cylindrical body of diameter to slide over said open projectile end of said firing tube providing open firing tube end and front end closed in a substantially air-tight circumferential joint by a light weight head; and range determining means affixed to said body of said firing tube said means comprising a plurality of spaced range markings imprinted upon a portion of the exterior of the said firing tube.

10. The invention of claim 9 wherein said range determining means are exposed above the operating end of said base tube prior to operation and are telescoped within said operating end after operation.

11. The invention of claim 9 wherein said range determining means include a plurality of spaced lines which when aligned with said operating end of the base tube function to initially position telescoping arrangement of said tubes as required for the desired projectile flight.

12. In a toy rocket, the combination of a base tube, a firing tube telescoping within said base tube in substantial-

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ly air-tight sliding engagement, and a projectile removably attached over projectile end of said firing tube in substantially air-tight sliding engagement; said base tube comprising a relatively long cylindrical, hollow body providing base end and operating end said base end closed in an air-tight end cap and said operating end being open to receive firing tube; said firing tube comprising a relatively long cylindrical, hollow body of diameter to slide within said base tube, providing open base end and open projectile end; said projectile comprising a hollow cylindrical body of diameter to slide over said open projectile end of firing tube providing open firing tube end and front end closed in a substantially air-tight circumferential joint by a light weight head; a finned cylindrical collar encircling projectile body and cemented thereto near said open end supporting a plurality of circumferentially spaced fins projecting perpendicularly from said collar; a hollow conical cam collar encircling said base tube and cemented thereto at operating end providing a continuous, circular, forwardly inclined cam surface, operating means detachably engaging a plurality of peripherally spaced means on said finned collar for manual retraction of said firing tube into telescoping relation with said base tube, said operating means contacting said operating cams after substantial telescoping movement of said firing tube within said base tube to disengage said operating means from said finned collar whereby a volume of air may be compressed within said tubes and the energy contained by said compressed air may be utilized to propel said projectile said cam collar having sliding contact with said operating means when toy rocket is being used.

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