Dec. 18, 1962 L. W. BROWN ET AL 3,068,792

ROCKET-LIKE AERIAL TOY

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Fig. 1.

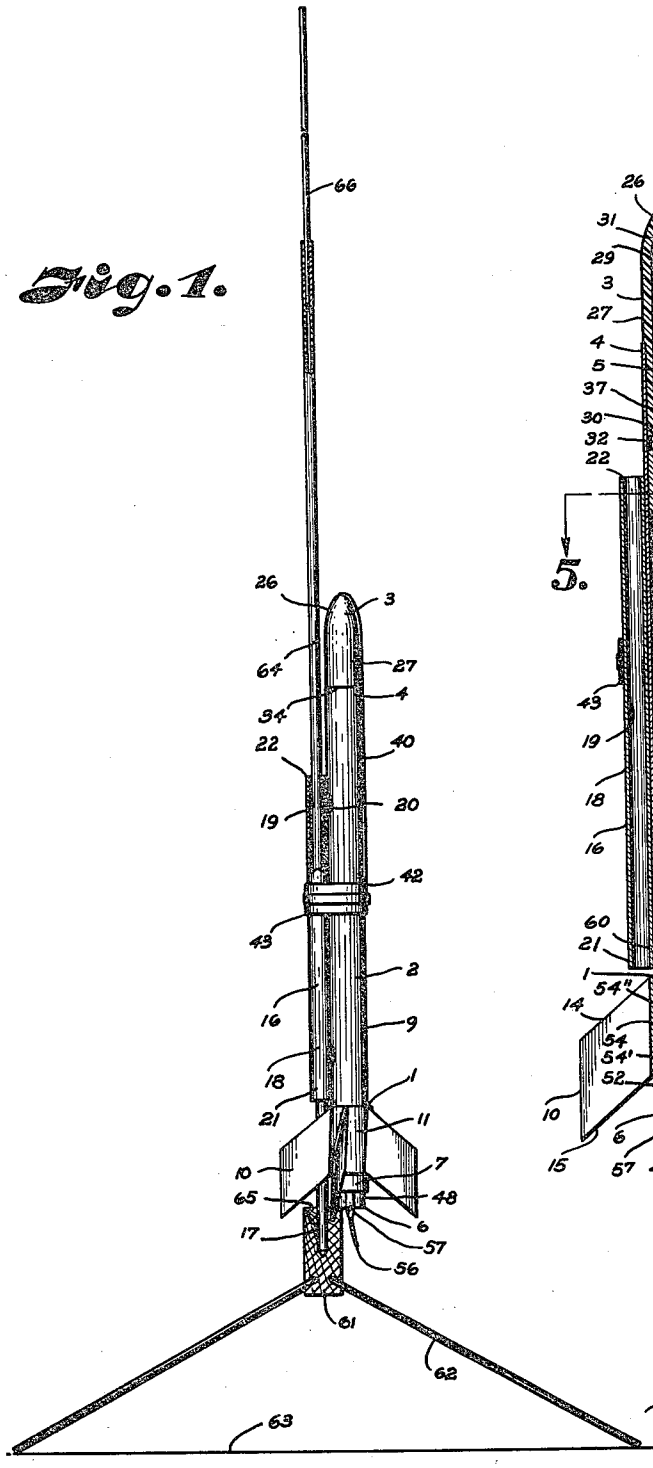
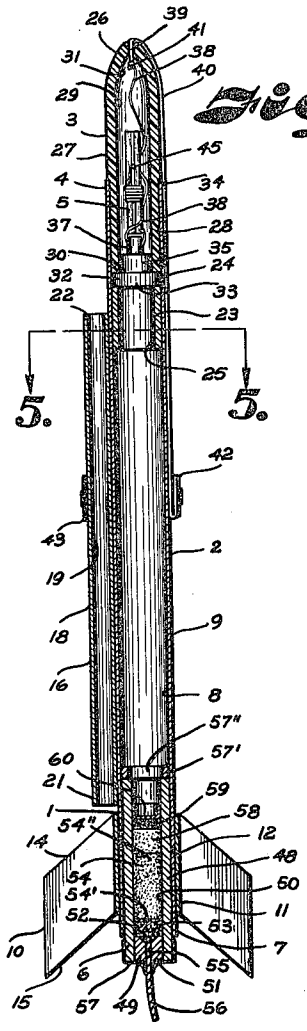


Fig. 2.



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Fig. 3.

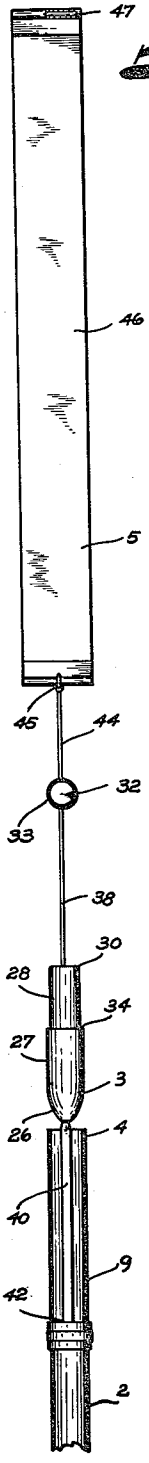
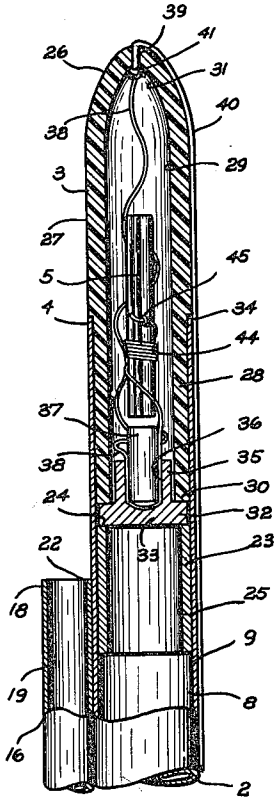


Fig. 4.



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Fig. 7.

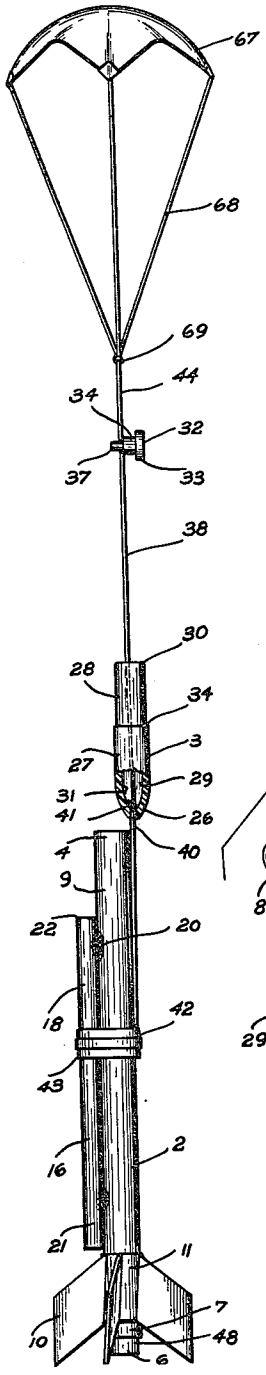


Fig. 5.

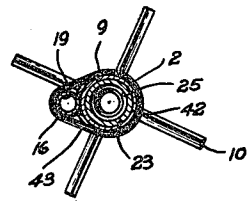
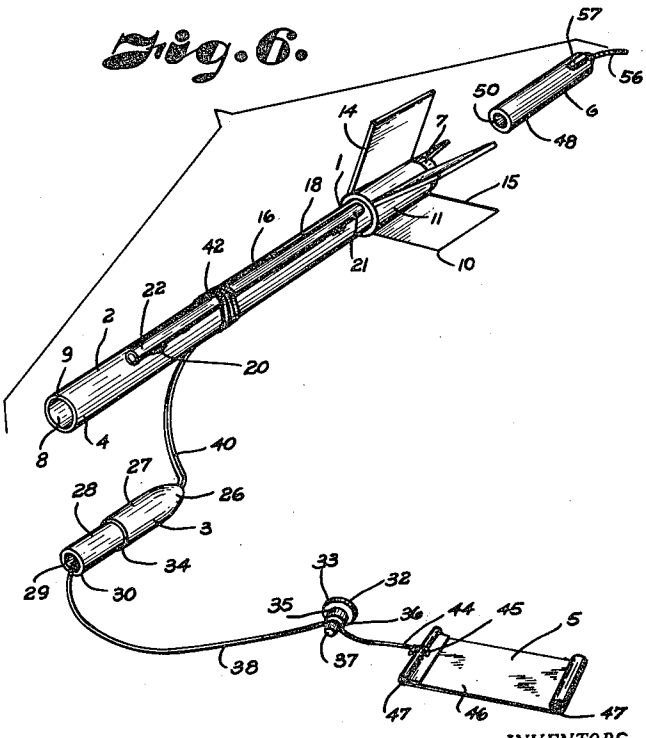


Fig. 6.



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Fig. 8.

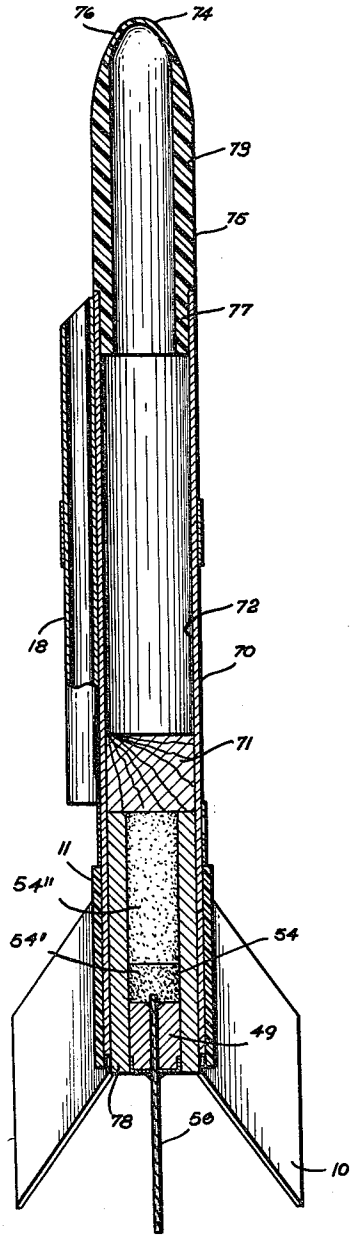
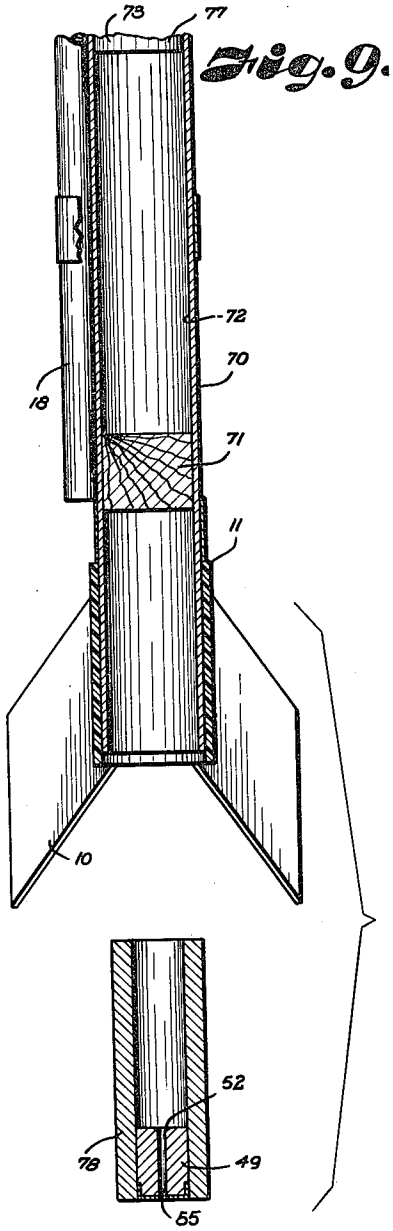


Fig. 9.



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3,068,792
ROCKET-LIKE AERIAL TOY

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3 Claims. (Cl. 102—34.1)

This invention relates to rockets and like aerial missile toys, and more particularly to such devices which are propelled by discharge of gases formed by burning of a propellant charge positioned therein.

The principal objects of the present invention are to provide a missile in the form of a projectile of separable parts which are propelled into the air in assembled condition by the burning of a propellant therein and at the end of the burning of said propellant the separable parts are expelled one from the other; to provide a missile in the form of a projectile which is propelled into the air by a propellant and which after a substantially predetermined period of travel will discharge a connected descent retarding device for slowing the fall of the missile; to provide such a missile having a tubular body with a descent retarding device removably enclosed in one end and a rocket shell or engine removably mounted in the other end; to provide such a missile wherein the rocket shell or engine is a casing enclosing a propellant charge with a jet aperture in the rear end whereby the burning of the propellant charge forms gases for discharge through the aperture to effect propulsion of the missile; to provide such a missile including connected tubular body, nose member and descent retarder wherein the rocket shell has an explosive charge in the forward end thereof which is ignited at the end of the burning of the propellant charge and expels the nose member and descent retarder from the body near the end of its upward travel; to provide a missile in the form of a projectile having a tubular body with a rocket shell or engine removably mounted in one end with said rocket engine including a casing enclosing a propellant charge with a jet aperture in the rear end for discharge of gas from burning of said charge for propulsion of the missile; to provide such a missile with a guide track or tube on the body and a launcher wherein said guide track slidably engages an elongate launching guide rod of the launcher to guide the missile in its initial motion; and to provide such a missile toy that is inexpensive, highly entertaining and that may be recovered and reused repeatedly.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a side elevation of a missile embodying the features of the present invention mounted on a launching guide with portions broken away to illustrate the structure.

FIG. 2 is a longitudinal sectional view through the missile in assembled condition.

FIG. 3 is an elevational view of the upper portion of the missile body with the nose member and descent retarder connected thereto and positioned for retarding descent thereof.

FIG. 4 is an enlarged sectional view through the forward portion of the missile to illustrate the arrangement of the descent retarder in the nose member in assembled position.

FIG. 5 is a transverse sectional view through the missile body on the line 5—5, FIG. 2.

FIG. 6 is a disassembled perspective view of the parts of the missile.

FIG. 7 is a side elevational view of the missile with a modified form of descent retarder.

FIG. 8 is a longitudinal sectional view through a further modified form of missile.

FIG. 9 is a partial longitudinal sectional view through the missile shown in FIG. 8 with the parts separated after burning of the propellant.

Referring more in detail to the drawings:

1 generally designates an aerial missile consisting of a body 2 with a nose member 3 at the forward end 4 of the body and a descent retarder device 5 enclosed in the nose member 3 and a rocket shell or engine 6 removably positioned in the rearward end 7 of said body.

The body 2 preferably is an elongate tube made of lightweight material such as suitable synthetic resin or aluminum or formed of tightly rolled paper whereby said body is substantially non-inflammable. The missile body preferably has a through longitudinal axial bore 8 whereby the wall 9 of the body is substantially of uniform thickness. A plurality of guide fins 10 are suitably secured to the rearward portion adjacent the rear end 7 of the body 2 and extend substantially radially therefrom in circumferentially spaced relation. In the illustrated structure, the guide fins 10 are mounted on a sleeve 11 having a through longitudinal bore 12 of a size that said sleeve is pressed onto the rear portion of the body in tight engagement therewith. The fins 10 and sleeve 11 are preferably made of synthetic resin or other suitable material and the fit of the sleeve on the body normally will retain the sleeve in place thereon, however, the anchor for the sleeve may be enhanced by a suitable adhesive or the like if desired. The fins have forward and rearward edges 14 and 15 respectively inclined rearwardly and outwardly from the body, as illustrated in FIG. 2. The fins are also preferably inclined relative to a longitudinal axial plane whereby during flight air movement by the fins tends to effect rotation of the missile about the axis thereof. A guide tube or track 16 is secured to the missile body and is adapted to engage a launcher guide 17 to guide the missile during its initial movement. In the illustrated structure, a small tube 18 is suitably secured to the side of the body 2 and extending longitudinally thereof. The tube 18 has a longitudinal bore 19 extending therethrough with the axis thereof parallel to the axis of the body 2. The tube 18 is suitably secured to the body 2 by suitable fastening means such as adhesive or glue 20 and is positioned whereby the rearward end 21 is spaced slightly forwardly of the forward end of the sleeve 11, and the forward end 22 of said tube 18 is spaced substantially rearwardly of the forward end 4 of the body member. However, the guide tube is of suitable length to provide sufficiently long engagement with the launcher guide 17 to maintain the missile in alignment therewith. An annular collar 23 is inserted in the forward end of the body 2 and preferably positioned adjacent the forward end 22 of the guide tube 18 to provide a shoulder 24 spaced rearwardly from the forward end 4 of the body for sufficient insertion of the nose member in the body as later described. The annular collar 23 is preferably a press fit into the bore 8 of the body 2 whereby friction will hold it in place; however, it may be further secured by suitable adhesive, if desired. The collar 23 has a bore 25 extending axially therethrough, as illustrated in FIG. 4.

The nose member 3 is preferably molded of synthetic resin or other suitable material and has an ogive forward end or nose 26 with the rearward portion thereof merging in a cylindrical portion 27 preferably substantially the same diameter as the outer diameter of the body 2. The rearward portion 28 of the nose member is reduced in size whereby the outer surface thereof conforms to the inner surface of the forward portion of the body

member 2. The rearward portion 28 of the nose member is inserted into the body member and the frictional engagement of the nose member portion 28 in the bore 8 of the body 2 forms a releasable connection whereby the nose member may be expelled from the body 2 as later described. The nose member 3 has an axial cavity 29 opening from the rear end 30 thereof and terminating in spaced relation to the forward end as at 31. The rear end opening of the cavity 29 is closed by a plug 32 having a head portion 33 engaging the rear end 30 of the nose member which is preferably spaced from the forward end of the collar 23 a distance corresponding to the thickness of the plug head 33. When the shoulder 34 on the nose member engages the forward end of the body member 2, the plug 32 has a shank portion 35 extending into the rear portion of the cavity 29 and has a loose fit therein. The forward end of the plug shank has a socket 36 extending therein to receive a wedge member or cork 37 cooperating with the plug in securing a line 38 thereto. The forward end of the nose member has an aperture 39 and a resilient cord or band 40 has one end 41 extending through the aperture and anchored in the cavity 29. The resilient cord or band 40 extends outwardly of the nose member and along the side thereof and longitudinally of the body member 2 and has the other end connected to an anchor 42 spaced from the forward end of the body 2. The anchor 42 preferably consists of a plurality of strips of adhesive tape 43 wound around the body member 2 and guide tube 18 as illustrated in FIG. 2. The resilient band 40 is preferably of such length that it is under tension when the nose member 3 is inserted in the forward end of the body whereby the tension of the resilient cord aids in holding the nose member in said body member. The end of the cord 40 in the cavity 29 is preferably connected to one end of the line 38 which line extends into the socket 36 under the cork 37 and out the opposite side whereby said line is secured to the plug 32 by the cork, with the length of the line between the plug and the end secured to the resilient band being substantially greater than the length of the nose member. The other portion 44 of the line 38 extends from the plug and is attached as at 45 to a descent retarding device 5.

In the structure illustrated in FIGS. 1 to 6 inclusive, the descent retarder 5 consists of a flexible strip 46 such as thin synthetic resin with the end portions folded over a stiffener such as rods 47. The strip is rolled and the line wound therearound and inserted in the cavity 29 and then the plug 32 inserted in the rear end of the nose member and the nose member inserted in the body in the positions illustrated in FIG. 4.

The rocket shell or engine 6 preferably consists of a tube 48 made substantially non-inflammable by forming same of tightly rolled paper. The rear end of the tube 48 is closed by an end member or plug 49 preferably formed of ceramic material. The end member 49 has a tight fit into the bore 50 of the tube 48, and, if desired, may be cemented or otherwise secured in place with the rear face 51 of the end member flush with the rear end of the tube 48. The forward end of the end member 49 is preferably provided with a conical socket 52 adapted to receive a conical projection 53 on a propulsion charge 54, said charge preferably consisting of suitable propellant powder, for example, black powder pressed into a cylindrical shape to fit into the bore 50 of the tube 48. It is preferable that the propulsion charge 54 have a slow burning portion 54' adjacent the end member 49 and a faster burning portion 54'' extending from the portion 54' toward the other end of the tube 48. This provides a short period of burning before the initial movement of the missile. The end member 49 is provided with an axial aperture 55 of such size to receive a standard size fuse 56 of suitable length whereby the inner end of said fuse rests in the recess or socket 52 in contact with the charge 54 so any burning of the fuse will ignite said charge. The fuse 56 is preferably held in the aperture by an adhesive tape 57 such as cellophane tape, said tape being wrapped around the fuse adjacent the tube face 51 of the end member and the ends of the tape are drawn upwardly along the outside of the rear portion of the tube 48 and secured thereto, the tape extending along the outside of the tube for substantially the length thereof desired to extend from the body 2 when in assembled position as when the forward end of the tube 48 engages a stop ring 57' secured in the body 2 as illustrated in FIG. 2. The quantity of the propulsion charge 54 is such that in burning it will provide substantially the duration of the flight desired, and at the forward end of said charge is a second charge 58 providing a slower burning and a time delay before ignition of an explosive charge 59 at the forward end of the charge 58. Suitable packing or wadding 60 is pressed into the forward end of the tube 48 in contact with the explosive charge 59.

The launcher 17 preferably consists of a block 61 having a plurality of legs 62 extending outwardly and downwardly whereby when the ends of the legs 62 are engaged with the ground or supporting surface 63 the block 61 is positioned whereby a guide member 64 extends from the upper end 65 of the block in an upright position. The guide member 64 is preferably a slender tube with a rod 66 sleeved in the upper end thereof whereby said rod may be detached for carrying purposes, but when positioned for launching the rod 66 extends the length of the launcher guide.

The operation of the aerial toy constructed as described is as follows:

The body 2, with the nose member 3 and descent retarder 5 assembled and positioned as illustrated in FIG. 4, is then provided with the rocket shell or engine 6 which is inserted into the rear end of the body bore 8 preferably until the forward end engages the stop ring 57'. The rocket shell 6 forms a substantially gas-tight fit in said body bore 8 whereby the engagement of the tube 48 with the wall 9 of the body forms a removable mounting for the rocket shell 6. The missile is then moved to the upper end of the launcher guide rod 66 in its extended position, and the rod 66 inserted through the bore 19 of the guide track 18, and the missile lowered on the launcher guide until the lower end of the rocket shell rests on the upper end 65 of the block 61, as illustrated in FIG. 1. The fuse 56 is then ignited, and the burning of the fuse will direct the flame into the recess 52 to the conical projection of the propellant charge 54 to ignite same creating gases which will escape through the jet aperture 55. The burning of the portion 54' of the charge provides a short period of gas discharge for sound and visual effects. Then the portion 54'' of the charge is ignited and the force of the escaping gases from the faster burning charge through the aperture 55 will provide a jet action which will cause the missile to be propelled upwardly along the launcher guide member to direct the missile path. As the missile leaves the launcher guide rod 66, air pressure on the vanes 10 will cause an axial rotation of the missile to aid in maintaining it in a straight line of flight. When the propellant charge is burned, the delayed action charge 58 is ignited and burns and will ignite the explosive charge 59 at approximately the peak of the flight of the missile. The explosive charge will create a force propelling the packing 60 forwardly, and also the gases from the explosive charge will cause a pressure on the plug 32 expelling same together with the nose member 3 from the body 2 of the missile. The resilient cord or band 40 will pull the forward end of the nose member 3 adjacent to the forward end of the missile body 2 and the plug 32 being loose in the nose member will fall therefrom drawing out the descent retarder 5 whereby during the free falling of the missile the nose member, plug and descent retarder will be positioned as illustrated in FIG. 3. During the descent, the flexible strip of the descent retarder will provide a flapping movement which is effective in retarding the descent of the

missile. After the missile is retrieved, the descent retarding device 5 is again rolled and positioned in the nose member 3, and the nose member 3 and plug 32 reassembled on the missile body. The spent rocket engine 6 is then removed from the rear end of the missile body and a new rocket engine 6 inserted in its place and the missile is ready for reuse. The bore 57'' in the stop ring 57' may be made smaller than the bore 50 of the tube 48 whereby the pressure of the gases from the explosive charge 59 will act on the rocket shell and the plug 32 whereby the spent rocket engine or shell and nose member will be expelled substantially simultaneously from the body 2.

In the form of the invention illustrated in FIG. 7, the structure of the missile and parts thereof are substantially the same as illustrated in FIGS. 1 to 6 inclusive, with the exception that the descent retarder is in the form of a parachute 67 having shrouds 60 connected as at 69 to the end of the portion 44 of the line 38. The use and operation of the missile illustrated in FIG. 7 is substantially the same as described relative to the form of the invention illustrated in FIGS. 1 to 6 inclusive.

In the form of the invention illustrated in FIGS. 8 and 9, the body 70 is an elongate tube that is substantially the same as the body 2 of the form of the invention illustrated in FIGS. 1 to 6 inclusive, with the exception that the collar 23 is omitted and a solid plug 71 is arranged in the body bore 72 in place of the stop ring 57', these changes being for manufacturing economy as the body 2 could be used without change and the plug 71 inserted to close the bore through the stop ring 57'. The body 70 has guide fins 10 and a tube 18 secured thereto in the same manner and performing the same function as the corresponding parts in the form of the invention illustrated in FIGS. 1 to 6 inclusive. A nose member 73 preferably formed of molded flexible synthetic resin, such as polyethylene or polyvinylchloride or other suitable material, with an ogive forward end or nose 74 merging in a cylindrical portion 75 preferably substantially the same diameter as the outer diameter of the body 70. The forward end portion preferably has a thin wall 76 to form a resilient end or cushion when the missile falls and the nose strikes the ground or other solid body. The rearward portion 77 of the nose member is reduced in size whereby it is inserted in the forward end of the body 70 and forms a tight fit therein to retain the nose member assembled on the body. The rocket engine or shell 78 is substantially the same as the rocket engine or shell 6 as shown in FIG. 2, with the exception that the slow charge 58 and explosive charge 59 and wadding 60 are omitted.

In the operation of the aerial toy constructed as illustrated in FIGS. 8 and 9, the body 70 and nose member 73 are assembled and positioned as illustrated in FIG. 8, and then a rocket shell or engine 78 is inserted into the rear end of the body 70 with the forward end of the shell or engine engaged with the plug 71. The missile is then moved to the upper end of the launcher guide rod 66 in its extended position, and the rod 66 inserted through the bore of the guide track or tube 18 and the missile lowered on the launcher guide until the lower end of the rocket shell rests on the upper end of the block 61. The fuse of the rocket shell is then ignited and the burning of the fuse will direct the flame into the propellant charge portion 54' whereby the slower burning portion of the charge will provide a short period of gas discharge for sound and visual effects. Then the fast burning portion of the propellant charge 54'' is ignited, and the force of the gases from the faster burning portion of the charge escaping through the jet aperture 55 will provide a jet action causing the missile to be propelled upwardly along the launcher guide member to direct the missile path. At the end of the burning of the propellant charge portion 54'' the gases therefrom acting on the plug 71 and end member 49 of the rocket engine or shell will expel the spent rocket engine from the body 70. This lightens the weight at the rear of the missile whereby when it reaches the peak of the flight it will then fall nose first to the ground, and the thin wall of the nose member will cushion the impact of the device when it hits the ground. The missile body and nose member can then be retrieved and a new rocket engine 78 inserted and the missile is ready for reuse.

It is to be understood that while we have illustrated and described certain forms of our invention, it is not to be limited to the specific forms or arrangements of parts herein described and shown except insofar as such limitations are included in the claims.

What we claim and desire to secure by Letters Patent is:

1. A rocket-like missile device comprising, a cylindrical body having a longitudinal axial bore, a nose member having one end removably sleeved into one end of the body bore, stabilizing means mounted on the body adjacent the other end thereof, said nose member having a recess therein opening from said one end of the nose member in the body, a descent retarder in said nose member recess, a plug loosely closing said nose recess, an elongate flexible member connecting said descent retarder to said nose plug and said nose plug to said nose member in separable relation, means connecting said nose member to said body in separable relation, an elongate propellant container removably sleeved in said body bore at said other end of the body for substantially the length of said container, means in said body engaging said container and limiting movement thereof toward said nose member, a jet aperture in the rear of said propellant container and axially thereof, means extending through said jet aperture for igniting propellant in the container therefor adjacent said jet aperture whereby progressive burning of the propellant forms gases for discharge through the jet aperture axially of said body to propel the missile, and an explosive charge at the end of the propellant for ignition at the end of the burning of said propellant and forcing the nose member from the body whereby the plug in the nose member moves therefrom pulling the descent retarder out of the nose member for operation in slowing the descent of the missile.

2. A rocket-like missile device comprising, a cylindrical body having a longitudinal axial bore, a nose member having an ogive nose at one end and the other end removably sleeved into one end of the body bore, stabilizing means mounted on the body adjacent the other end thereof, said nose member having a recess therein opening from said other end of the nose member, a descent retarder in said nose member recess, a plug loosely closing said nose recess, an elongate flexible member connecting said descent retarder to said nose plug and said nose plug to said nose member in separable relation, means connecting said nose member at the forward end thereof to said body in separable relation, an elongate propellant container having a propellant charge therein removably sleeved in said body bore at said other end of the body for substantially the length of said container, a jet aperture in the rear of said propellant container and axially thereof, means extending through said jet aperture for igniting the propellant charge adjacent the rear of said propellant container whereby progressive burning of the propellant charge forms gases for discharge through the jet aperture axially of said body to propel the missile, an explosive charge at the end of the propellant charge for ignition at the end of the burning of said propellant to force the nose member from the body whereby the plug in the nose member moves therefrom pulling the descent retarder from said nose member for operation in slowing the descent of the missile, and a guide means extending longitudinally of said body for following a fixed path during launching movement.

3. A rocket-like missile device comprising, a cylindrical body having a longitudinal axial bore, a nose member

having an ogive nose at one end and a cylindrical portion at the other end sleeved into one end of the body bore, stabilizing fins mounted on the body adjacent the other end thereof, said nose member having a recess therein opening from the rear end of the nose member in the body, a plug loosely closing said rear end of the nose member, a descent retarder in said nose member recess, an elongate flexible member connecting said descent retarder to said nose plug and said nose plug to said nose member in separable spaced relation with the nose plug between said nose member and descent retarder, a resilient cord connecting the forward end of said nose member to said body in separable relation, a tubular guide track secured to said body and extending longitudinally thereof, a launcher guide having an upright slender shaft, said tubular guide having a longitudinal bore whereby said guide is loosely sleeved over said launcher shaft, an elongate tubular propellant container removably sleeved in said body bore at said other end of the body for substantially the length of said propellant container, a non-inflammable plug in the rear end of said container and having an axial aperture extending therethrough, a closure member sleeved into the forward end of said container,

a propellant charge in said container between the plug and closure member, a fuse extending through said plug aperture and engaging the propellant charge adjacent said non-inflammable plug whereby ignition of the fuse effects ignition of the propellant charge and progressive burning of same forms gases for discharge through said aperture in an axial jet propelling said body, an explosive charge at the end of the propellant charge remote from said plug for igniting at the end of the burning of said propellant charge and forcing the closure member from said shell through the body bore to impact the nose plug and force said nose member and connected plug from the body whereby the nose plug moves from the nose member and pulls the descent retarder therefrom and the flexible member permits separation and release of the descent retarder to slow descent of the missile.

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