Dec. 10, 1963 E. L. MERRITT 3,113,398

ROCKET TOY

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Fig. 1.

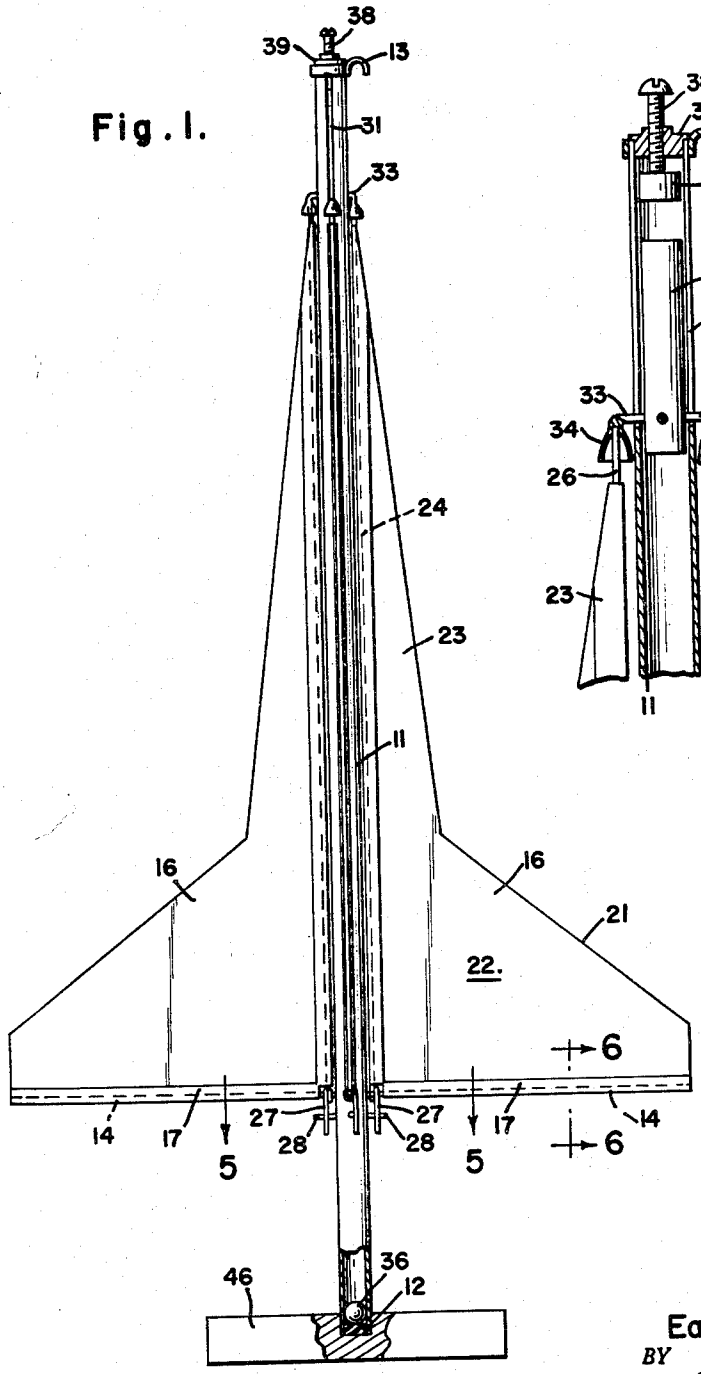


Fig. 2.

INVENTOR.

Earl L. Merritt

BY

Julian Caplan

attorney

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Fig. 3.

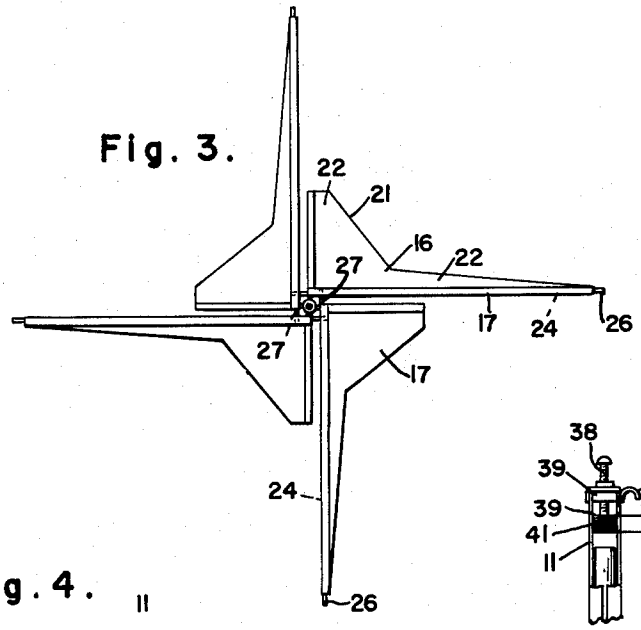


Fig. 4.

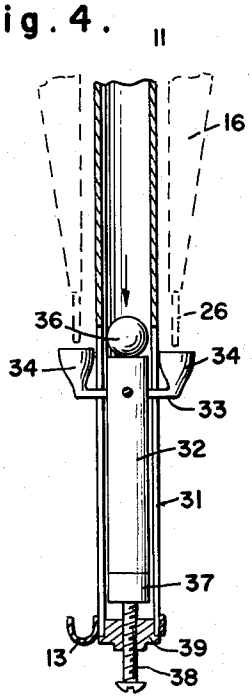
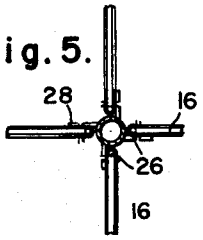


Fig. 5.



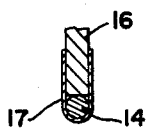
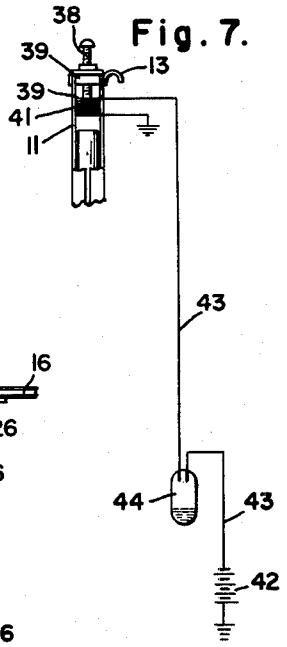


Fig. 6.

Fig. 7.



INVENTOR.

Earl L. Merritt

BY

Julian Caplan
attorney

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3,113,398

ROCKET TOY

Earl L. Merritt, 50 W. Summit Drive, Redwood City, Calif.

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4 Claims. (Cl. 46—235)

This invention relates to a new and improved rocket toy. More particularly, the invention relates to a rocket which may be launched by various means such as by rubber bands, or the like, and which is characterized by the fact that a plurality of vanes is hingedly attached to the rocket and initially secured in a position parallel to the direction of flight with the provision of means for releasing the vanes when the rocket commences its descent so that the vanes pivot to a position transverse to the direction of the descent and brake the fall of the device.

One of the features and advantages of the invention is the provision of means for slowing the descent of the rocket so that the rate of fall is reduced to a point where the possibility of damage upon striking the ground is greatly reduced.

A still further feature of the invention is the provision of various alternate and cooperating means to insure that the vanes are released when the rocket commences its descent and yet the vanes are held securely in position during the upward flight of the rocket.

A still further feature of the invention is the multiplicity of different means for releasing the catch holding the vanes erect, several of which afford instruction in principles of physics. For example, it is a well-recognized physical principle that in a vacuum bodies of different weights fall at a uniform rate under the acceleration of gravity. However, in ordinary atmosphere the resistance of the air causes objects of different density or different wind resistance to fall at different rates. Accordingly, there is provided in the present invention an illustration of these principles in that a sliding plug is provided within the tubular body of the rocket and comprises sockets in which the ends of the vanes are received. The vanes themselves offer certain resistance to free flight and tend to slow down the descent of the tubular rocket body, whereas the plug is not similarly retarded. This results in the plug falling in advance of the tubular body and thereby releasing the catch for the vanes.

A further illustration of the same principle is occasioned by a ball sliding within the tubular body. Such ball rolls down the tube during descent although in a vacuum it would fall at the same rate as the tube and hence remain stationary. The ball is so located as to impinge upon the end of the plug heretofore mentioned and dislodge the ends of the vanes from the plug if they should tend to stick.

Still another physical principle is that of magnetism. The plug heretofore mentioned is of a magnetically attracted material such as steel and is located adjacent a permanent magnet which can be adjusted in location relative to the plug so that the plug is just outside the magnetic field and as soon as the plug begins to move it is attracted by the magnet, thereby positively moving the plug away from the vanes to release the catch.

A still further feature of the invention is the optional provision of a coil of wire around the magnet controlled by a mercury or other gravity-responsive switch so that when the rocket begins its descent a current is passed around the magnet to augment the magnetism thereof.

The present invention has a relatively light weight so that it can be launched and fired to considerable altitudes

without the necessity of using dangerous launching instrumentalities. Thus, by means of an ordinary rubber band and inserting the hook on the nose of the rocket through a loop thereof the rocket will rise to a height of 150 feet or so without danger of injury.

A still further feature of the invention is the fact that the construction is simple and rugged, yet inexpensive.

A still further feature of the invention is the construction of the rocket and its operation in such manner as to reduce the likelihood of damage either in launching or in descent.

A principal feature of the invention is the fact that considerable educational as well as amusement value is achieved in the construction hereinafter described in detail.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a side elevation of the rocket with vanes erect.

FIG. 2 is an enlarged fragmentary vertical sectional view through the upper end thereof.

FIG. 3 is a bottom plan with the vanes extended.

FIG. 4 is a view similar to FIG. 2, showing the rocket on descent with the catch for the vanes released and the vanes ready to move from position parallel to the tubular body to the extended position of FIG. 3.

FIGS. 5 and 6 are fragmentary sectional views taken substantially along the lines 5—5 and 6—6 of FIG. 1.

FIG. 7 is a side elevation, partially schematic, showing a modification of the device wherein the permanent magnet is augmented by an electro-magnet, gravity controlled.

The present invention is preferably formed of a tubular body 11 of light metal provided with a plug 12 at the tail and a hook 13 at the nose. The body may be launched by extending the hook through a loop in a rubber band and pulling the tail relative to the rubber band. Various other means may be used for launching, such as compressed air or an explosive propellant. Adjacent but spaced from the tail is a plurality of radially extending pins 14, here shown as four in number. For each pin 14 there is a vane 16 having a sleeve 17 at its lower end encircling the pin so that the vane can pivot between the vertical position of FIG. 1 parallel to the tube 11 to an extended position transverse to the tube as shown in FIG. 3. The shape of the vane 16 is optional but in the form here shown the edge 21 of the rearward portion thereof extends outwardly at an angle of about 45° to provide a truncated triangular base 22. Above the base 22 is a thin triangular portion 23 extending towards the nose. The inner edge of each vane is rigidified by a rod 24 extending therealong. Rod 24 projects beyond the upper end of the vane in a point 26. Rod 24 also extends beyond the bottom end of the vane in an extension 27. Four pins 28 are set in tube 11 and each engages one of the bottom extensions 27 to align the vanes so that they do not swing upwardly beyond vertical position. Each bottom extension 27 in extended position of the vanes shown in FIG. 3 contacts the next adjacent vane and thus prevents the vanes from pivoting beyond a position transverse to body 11. It is apparent that in the upright position of the vanes little resistance is offered to the flight of the rocket although, as will be well understood, there is a slight air resistance which slows down the flight of the rocket beyond that of free flight. In the extended position shown in FIG. 3 a considerable air resistance is provided by the vanes.

In the upper end of the tubular body 11 are longitudinal

slots **31** corresponding in number and location to the vanes **17**. Slidable within tube **11** adjacent slots **31** is a plug **32** formed of a magnetizable material such as steel and having radially extending pins **33** which pass through slot **31** and are provided with sockets **34** facing points **26**. Sockets **34** are generally bell shaped so that the point **26** fits readily thereinto and once fitted are located with the vanes properly aligned parallel to the shaft. This facilitates setting the rocket for flight. It will be seen that the plug **32** slides within the tube **11** at least the length of slot **31** and that in downward position as shown in FIG. 2 the points **26** and hence the vanes **17** are held in upright position. When the plug **32** moves towards the nose a sufficient distance, the points **26** are released.

When the plug **32** is set in the position of FIG. 2, it tends to remain in such position so long as the tube **11** is upright. However, when the tube **11** is inverted from the position of FIG. 2 to position of FIG. 4, the resistance to gravitational forces of the plug **32** is minimal whereas the wind resistance of the rocket as a whole is greater. This allows the plug **32** to fall at a faster rate than the remainder of the rocket and causes relative movement of the plug **32** and the tube **11** until the points **26** of the vanes **17** escape from the sockets **34**, whereupon the vanes **17** pivot about pins **14** to the position of FIG. 3. The movement of the plug **32** in tube **11** is supplemented by means of ball **36** which rolls within the tube and on the descent of the rocket strikes plug **32** and tends to dislodge the same if it sticks in the tube.

A still further augmentation of the movement of the plug **32** is occasioned by the permanent magnet **37** located on the end of screw **38** threaded into the plug **39** on the nose of body **11**. Proper location of magnet **37** so that the plug **32** is positioned relative to the field of the magnet so that it is almost, but not quite, pulled toward the nose is desirable. As soon as the plug **32** tends to move toward the magnet **37**, it enters the field of attraction thereof causing the plug **32** to be moved relative to the tube. The magnet also tends to hold the plug **32** in raised position.

A modification of the invention is shown in FIG. 7. A coil **41** of wire surrounds the permanent magnet **37**, and one end is grounded to body **11**. In the opposite end of the tube **11** is a battery **42**, one terminal thereof being grounded to the tube. In the lead wire **43**, leading from battery **42** to coil **41**, is a mercury switch **44** or other switch responsive to gravity. When the body is in upward flight switch **44** is open, but as soon as the rocket begins its descent switch **44** is closed, thereby causing a current to pass through coil **41** and augmenting the magnetic attraction of magnet **37** so that plug **32** is pulled toward the nose of the body.

In use, the rocket is initially held on its launching pad **46** or stationary support, the end of the tube **11** fitting into a socket in the support. In such position the vanes **16** are raised to vertical position and the plug **32** slid downward until the bell shaped sockets **34** receive the points **26** of the rods **24**, the shape of the bell centering the points so that the vanes are accurately aligned parallel to the tube **11**. The bottom extensions **27** of the rods **24** contact pins **28** and likewise tend to hold the vanes in alignment. Screw **38** is turned so that the plug **32** is just outside the field of magnetic attraction of the magnet **37**. Thereupon a rubber band on a stick is held by the user and the hook **13** passed through a loop of the rubber band. It will be understood that other means may be used for launching. When the rubber band is extended and the rocket released, free flight begins and it has been found that a flight in excess of 150 feet may be readily attained. So long as the rocket is flying upward, the vanes **16** are held in place by the sockets **34**. As soon as the rocket starts its descent, however, plug **32** begins to slide relative to the tube **11** toward the nose. This sliding movement is augmented by ball **36** striking the plug **32** and driving it towards the nose. The magnet **37** likewise tends to pull the plug **32** toward the nose once the plug enters sufficiently the field of magnetic attraction. Where the modification of FIG. 7 is used, a current passes through coil **41** and augments the attraction of the permanent magnet **37**. As soon as the plug **32** slides far enough so that the points **26** of the rods **24** are released from the rockets **34**, the vanes **16** swing out, that is the sleeves **17** rotate around the pins **14**, until the extensions **27** contact the adjacent vanes, whereupon the vanes are held in position perpendicular to the tube, as in FIG. 3. The resistance of the vanes **16** in extended position is considerable and the descent of the rocket is impeded so that it does not strike the ground with sufficient force to damage the rocket. The balance of the various parts is achieved by the location of the pivot pins **14** relative to body **11** and the location of weight in the nose, thereby causing the rocket to descend nose foremost.

As has been indicated above, the foregoing invention provides a rocket toy having considerable educational value and illustrating a number of principles of physics as well as their exceptions, all as heretofore explained. At the same time the rocket has considerable amusement value.

What is claimed is:

1. A rocket toy comprising a body, a plurality of vanes, means mounting said vanes on said body for pivotal movement between a flight position substantially parallel to said body and a descent position substantially transverse to said body, each said vane having a pin projecting from its end opposite said means, a magnetizable plug slidable inside said body and having a plurality of sockets each disposed outside said body to receive one of said pins, said plug being slidable to move downward relative to said body on the descent of said toy to release said sockets and pins for outward movement of said vanes, and a magnet in said body attracting said plug to move downward relative to said body on the descent of said toy.

2. A toy according to claim 1, which further comprises a ball slidable inside said body to contact said plug on descent of said toy to drive said plug downward.

3. A toy according to claim 1, which further comprises adjustment means for adjusting the position of said magnet inside said body.

4. A toy according to claim 1, in which said magnet is an electro-magnet and which further comprises a coil, a battery, a gravity-responsive switch and an electric circuit, including said electro-magnet, said coil, said switch and said battery.

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