

July 31, 1962

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3,046,966

TOY AIR COMPRESSOR ROCKET LAUNCHER

Filed Sept. 8, 1958

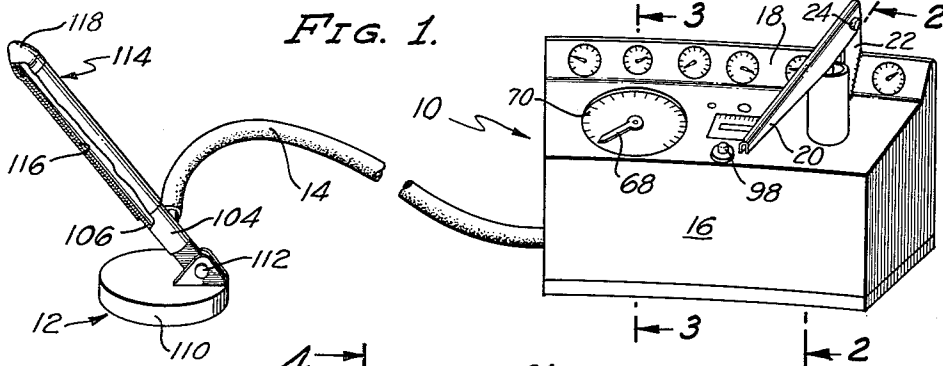


FIG. 1.

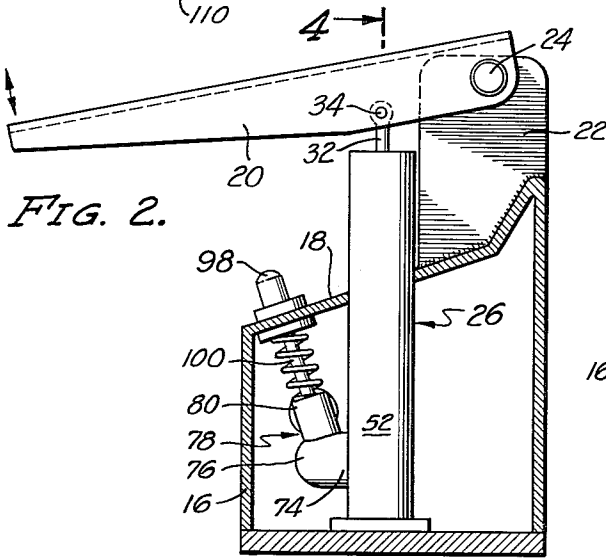


FIG. 2.

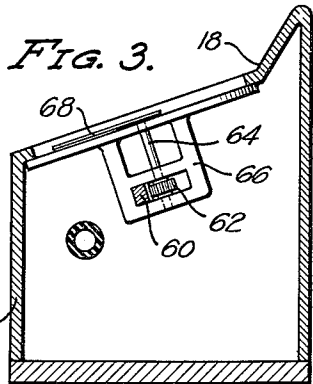


FIG. 3.

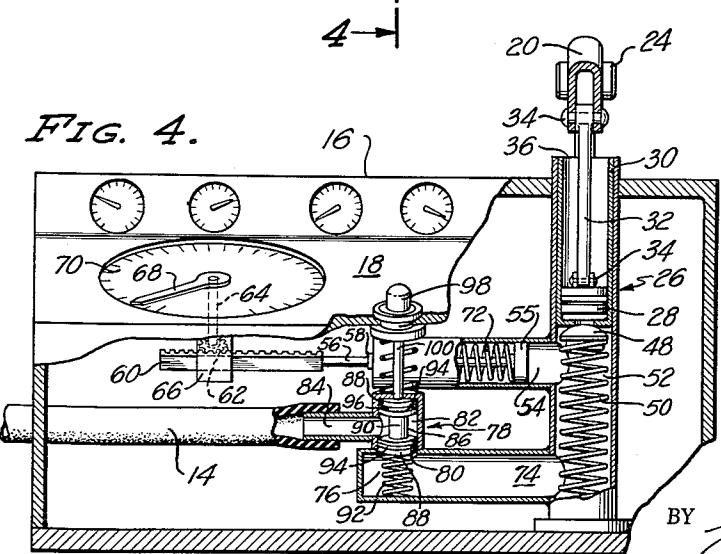


FIG. 4.

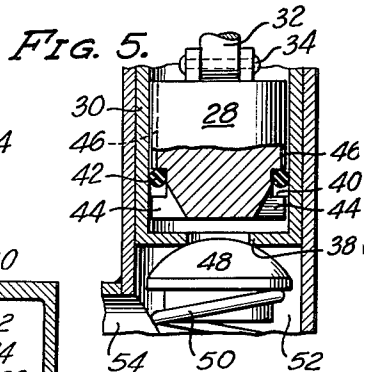


FIG. 5.

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3,046,966

TOY AIR COMPRESSOR ROCKET LAUNCHER

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Filed Sept. 8, 1958, Ser. No. 759,808

3 Claims. (Cl. 124-11)

This invention relates to new and improved toy air compressor rocket launchers, and to various component parts employed therein.

As more and more emphasis in scientific research is being placed upon various types of guided missiles, rockets and other similar aircraft, children are following the usual pattern, and desire to play with toys simulating these various types of adult equipment. A large number of toys simulating various types of aircraft, missiles, rockets and the like have been developed in the past, and many of these toys are being marketed at the present time.

Frequently the present toy rocket missiles, etc. tend to be comparatively expensive and tend to be comparatively complex. As an example of this, one common type of toy rocket is formed so as to utilize water as a reaction fluid in the bottom of the rocket and so as to utilize a valve outside of the rocket which holds air under pressure within the rocket itself. In order to manufacture a rocket so that it is capable of withstanding considerable air pressure it is necessary to manufacture this rocket out of comparatively thick material so that it is comparatively heavy. The weight of the rocket itself thus tends to be a limiting factor on the amount of flight available from the rocket. Also this type of construction is comparatively complicated because of the nature of the operative mechanism employed in developing air pressure and in releasing the rocket itself.

An object of the present invention is to provide a new and improved toy air compressor rocket launcher. Another object of this invention is to provide devices of this general type which are comparatively simple to construct and which are easy to utilize. A related object of this invention is to provide toys of this general type which are capable of withstanding the physical abuse normally accorded any toy by the average child.

A still more specific object of the present invention is to provide a toy rocket launcher which can be used with various types of simulated missiles, rockets, etc., and which can shoot such airborne objects at various different angles as may be desired. Another object of the present invention is to provide toy air compressor rocket launchers including pump means designed to hold air under pressure within a chamber, means for determining the amount of air pressure within this chamber, and valve means for releasing such air so as to cause an object to fly from a launcher. Another more detailed object of the present invention is to provide a new and improved combined piston and valve structure designed primarily to be used in compressing air. A still further object of the present invention is to provide a new and improved air release valve.

Still further objects of this invention as well as many specific advantages of it will be fully apparent to those skilled in the art to which this invention pertains from a

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detailed consideration of the remainder of this description including the appended claims and the accompanying drawings in which:

FIG. 1 is a perspective view of a toy air compressor rocket launcher of this invention;

FIG. 2 is a cross-sectional view taken at line 2-2 of FIG. 1;

FIG. 3 is a cross-sectional view taken at line 3-3 of FIG. 1;

FIG. 4 is a cross-sectional view taken generally in the direction of line 4-4 of FIG. 2; and

FIG. 5 is an enlarged detailed cross-sectional view of part of the structure illustrated in FIG. 4.

In all figures of the drawing like numerals are used to designate like parts wherever convenient for purposes of illustration and explanation. It is to be understood that the accompanying drawing is primarily intended so as to clearly indicate or designate a presently preferred embodiment of this invention. Those skilled in the art to which this invention pertains will realize however that a large number of differently appearing related toys may be manufactured utilizing the essential principles or features of this invention as herein described.

In order to explain this invention further reference is made directly to the accompanying drawing where there is shown a complete toy air compressor rocket launcher 10 which includes a launcher 12 connected by means of a hose 14 to a housing 16. This housing is preferably formed so that the top surface 18 of it simulates an instrument panel and so that a handle 20 is mounted upon an extension 22 from the surface 18 by means of a pin 24 in such a manner that this handle 20 may be rotated back and forth in order to actuate a compressor mechanism 26. The handle 20 itself is secured to a piston 28 within a cylinder 30 in this compressor mechanism 26 by means of a small link 32 which is pivotally attached to both the handle 20 and the piston 28 by means of pins 34. The cylinder 30 has an open top 36 and has at its bottom an internal flange 38.

The construction of the piston 28 which is adapted to be moved within the cylinder 30 as the handle 20 is moved up and down is considered quite important with this invention. Around the periphery of this piston 28 there is located a peripheral groove 40 which carries an O-ring 42 formed out of rubber or other similar resilient, elastomeric material. The length of this groove 40 is such that the O-ring 42 is free to move within it as the piston 28 is moved. However, the depth of the groove 40 is such that the O-ring 42 normally extends from the piston 28 so as to engage the interior of the cylinder 30 at all times.

On the side of the piston 28 adjacent to the flange 38 there is located at least one bleed groove 44. The bleed grooves 44 shown are of such dimension that when the O-ring 42 is at the side of the peripheral groove 40 adjacent to them air can pass between the grooves 40 and 44, but are of such dimensions that when the O-ring is located on the side of the peripheral groove 40 remote from the flange 38 the O-ring prevents air from moving through grooves 40 and 44. In order to provide for air movement through these grooves the end of the piston 28 remote from the bleed grooves 44 is formed so that at least part of the wall of this piston is spaced from the internal wall of the cylinder 30. As shown this may be

conveniently accomplished through the use of passages 46 extending from the peripheral groove 40 to the end of the piston 28 remote from the bleed grooves 44.

Those skilled in the art will realize the precise construction of the piston 28 used within the cylinder 30 is extremely simple and that this type of construction can be used for a great many different applications. With the present invention the piston 28 is used so as to compress air and so as to force such compressed air past a rounded valve body 48 which is normally held against the flange 38 so to form a seal therewith by means of a coil spring 50. As the handle 20 is moved upwardly the engagement of the O-ring 42 with the interior of the cylinder 30 causes this O-ring to move within the peripheral groove 40 so as to permit air to be drawn past the piston 28 through the passages 46 and through the grooves 40 and 44. When the direction of movement of the handle 20 is reversed this O-ring shifts within the peripheral groove 40 so as to seal off the passages 44 entrapping air within the cylinder 30. As the movement of the handle 20 in this direction is continued the so entrapped air is placed under compression and forces the valve body 48 away from the flange 38 so that this air is forced into a pressure chamber 52 within which the valve body 48 and the spring 50 are mounted.

This pressure chamber 52 may be formed so as to have a side cylindrical chamber 54 in communication therewith. This side chamber 54 contains a conventional piston 55 carrying a piston rod 56 which projects from the chamber 54 through a conventional opening 58. The end of the rod 56 carries a small rack 60 which engages a pinion gear 62 mounted on a shaft 64. This shaft 64 is rotatably supported on a bracket 66 within the housing 16 and extends to the surface 18 of this housing. Here a small pointer 68 is attached to the shaft 64 so that the position of the piston 55 is indicated by means of the position of the pointer 68 on a dial 70 formed on the surface 18.

A spring 72 is preferably employed so as to bias the piston 55 toward the principal part of the pressure chamber 52. Thus, as air pressure is built up within this pressure chamber the piston 55 is moved against the spring 72 so that accurate measure of the air pressure in the chamber 52 is visible at all times.

An extension 74 of the pressure chamber 52 connects to an inlet chamber 76 of a discharge valve 78 employed with the complete toy 10. In effect, the extension 74 serves as an inlet to the chamber 76 with this construction. Within the valve 78 a cylindrical opening 80 leads from the inlet chamber 76 to an outlet chamber 82 which is preferably of the same shape as the opening 80. A small outlet 84 is connected to the chamber 82 intermediate to its ends.

With the valve 78 a spool type of valve body 86 having cylindrical ends 88 connected by a center rod 90 is held by means of a spring 92 so as to normally be located within the chamber 82. O-rings 94 formed out of a flexible, elastomeric material are located in peripheral grooves 96 extending around the ends 88 and normally fit against the interior of the outlet chamber 82 so as to form a seal therewith at all times.

When it is desired to utilize the complete toy 10 a knob 98 on the surface 18 is depressed after air pressure has been built up within the pressure chamber 62 as previously indicated. Such motion is transmitted through a rod 100 to the valve body 86, causing this valve body to move a short distance against the spring 92. As this occurs an end 88 of this valve body moves from the opening 80 permitting air under pressure to escape from the chamber 52 through the outlet 84 of the valve 78.

Such air is transmitted through a flexible hose 14 attached to this outlet 84 adjacent to a closed end 104 of a tube 106 forming a part of a launcher 12. This launcher preferably includes a base 110 which is pivotally attached to end 104 of the tube 106 by means of a conventional

pivot pin 112 which is designed so that the tube 106 may be moved at various angles to the base 110 as may be desired for launching various type missiles, such as, for example, a missile 114. Such a missile, whether in the form of an airplane, a rocket or the like has a tubular interior 116 which fits closely against the exterior of the tube 106 and includes a closed end 118 fitting against the end of the tube 106 remote from the base 110.

As the valve 78 is actuated in this manner a "blast" of compressed air travels as indicated so as to hit against the closed end 118 of the missile 114. The impact of this air will send this missile a very substantial distance into the air at various trajectories depending upon the angle between the base 110 and the tube 106.

After a missile has been "shot" in this manner the knob 98 is released and air may be compressed within the pressure chamber 52 through the use of the handle 20 to any desired extent and then the entire operation involved in utilizing the toy may be repeated.

An important feature of this invention lies in the fact that the distance any missile is to be shot may be determined by a visual inspection of the pointer 68. Thus, if a child desires to use the complete toy 10 to shoot a missile only a short distance, such a child may determine when sufficient air pressure has been built up in the chamber 52 through observation of the pointer 68.

Those skilled in the art to which this invention pertains will realize that air compressor rocket launchers of this invention or parts thereof may be modified in a number of different ways through the exercise of routine engineering skill without departing from the essential nature of the invention itself as herein explained. They will further realize that many of the individual parts herein described and explained, such as, for example, the compressor mechanism 26 or the discharge valve 78 may be used apart from the complete toy structure herein shown and described although they are specially designed for use with this complete structure. For these reasons this invention is to be considered as being limited only by the appended claims forming a part of this disclosure.

We claim:

1. A toy air compressor rocket launcher which includes: a housing; a cylinder having an open top mounted within said housing; a handle pivotally mounted on said housing; a piston movable within said cylinder, said piston having a peripheral groove formed therein adjacent to said cylinder, at least part of the wall of said piston leading from said peripheral groove to the top of said cylinder being spaced from said cylinder, said piston also having bleed grooves formed therein leading from said peripheral groove to the side of said piston remote from said open top; link means pivotally attached to said piston and said handle; a flexible, elastomeric O-ring located in said peripheral groove, said ring extending from said peripheral groove so as to engage the interior of said cylinder, said ring being capable of moving within said peripheral groove as said piston is moved so as to allow air to pass around said piston and through said grooves or so as to seal said piston with respect to the interior of said cylinder; pressure chamber means within said housing; valve means connecting said pressure chamber means so as to only allow air to flow from said cylinder into said pressure chamber; discharge valve means mounted within said housing and connected to said pressure chamber means; means mounted on said housing for activating said discharge valve means so as to open the same; a flexible rubber conduit attached to said discharge valve means, said flexible conduit leading from said housing; and a launcher including a tube having a closed end and an open end adapted to carry an object so that a closed end of a passage within said object fits against the open end of said tube, the interior of said tube being connected to said flexible conduit.

2. A toy air compressor rocket launcher as defined in

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claim 1 wherein said launcher includes a base and wherein said tube is pivotally mounted on said base.

3. A toy air compressor rocket launcher as defined in claim 1 including gauge means for determining the amount of air pressure within said pressure chamber, said gauge means being mounted on said housing. 5

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