March 20, 1962 D. L. CROSMAN 3,025,846

TOY PROJECTILE LAUNCHER

Filed April 29, 1960 4 Sheets-Sheet 1

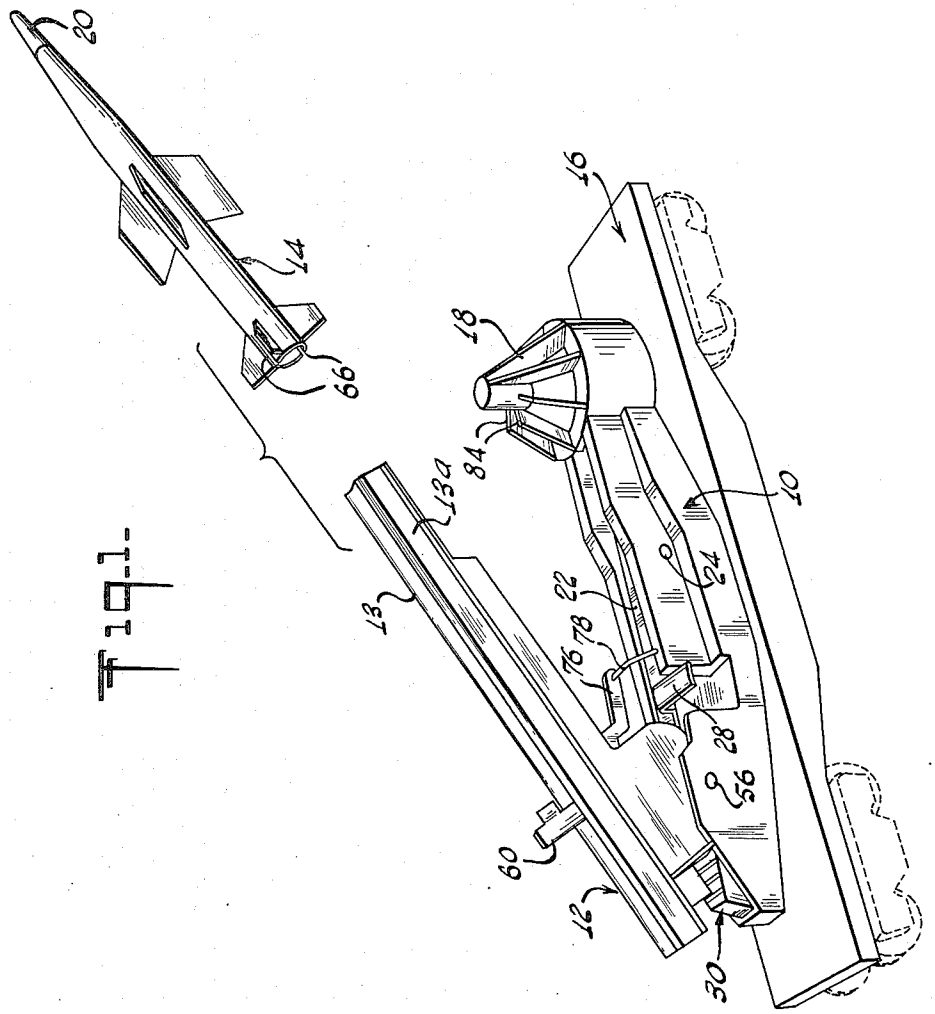

Fig. 1.

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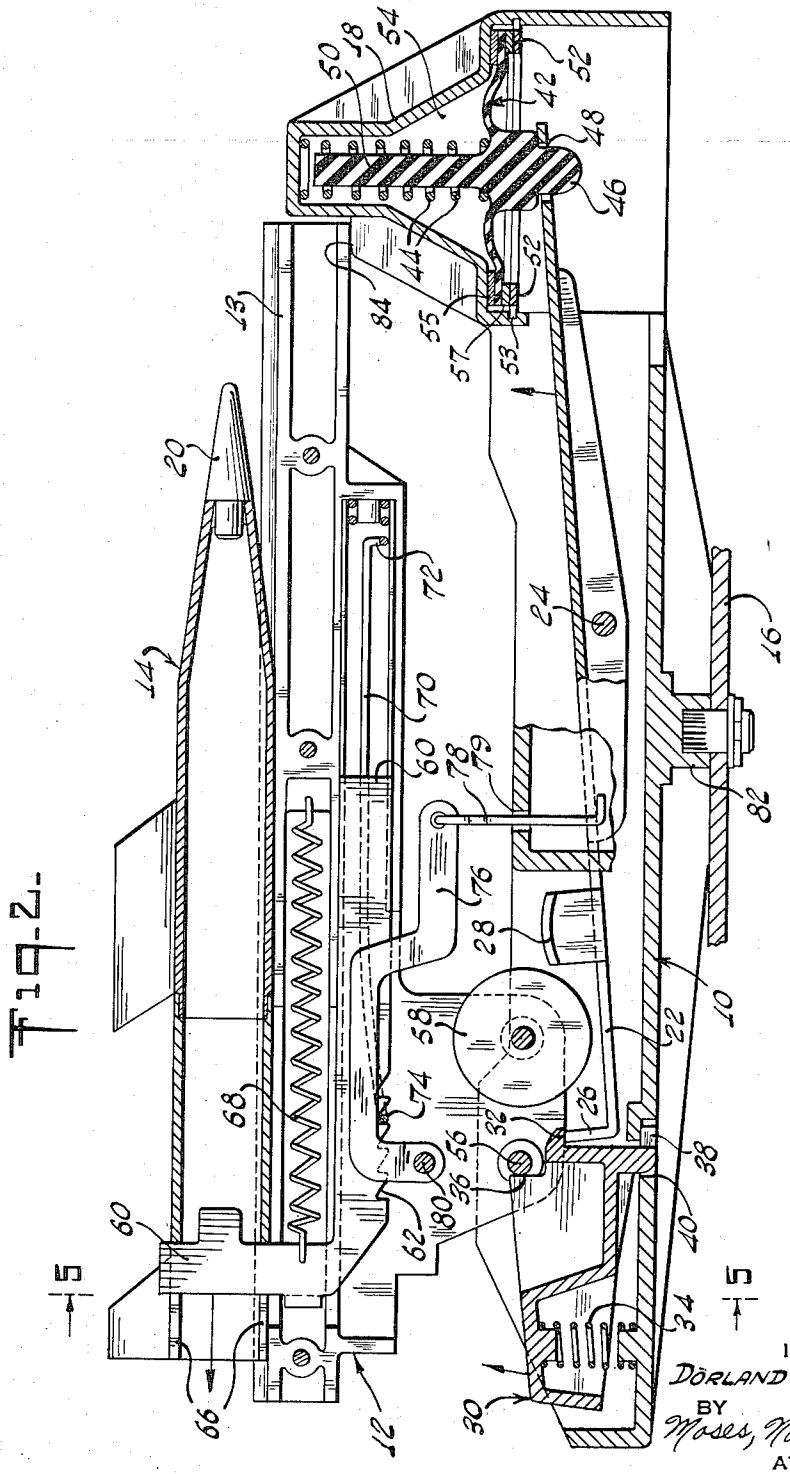

Fig. 2.

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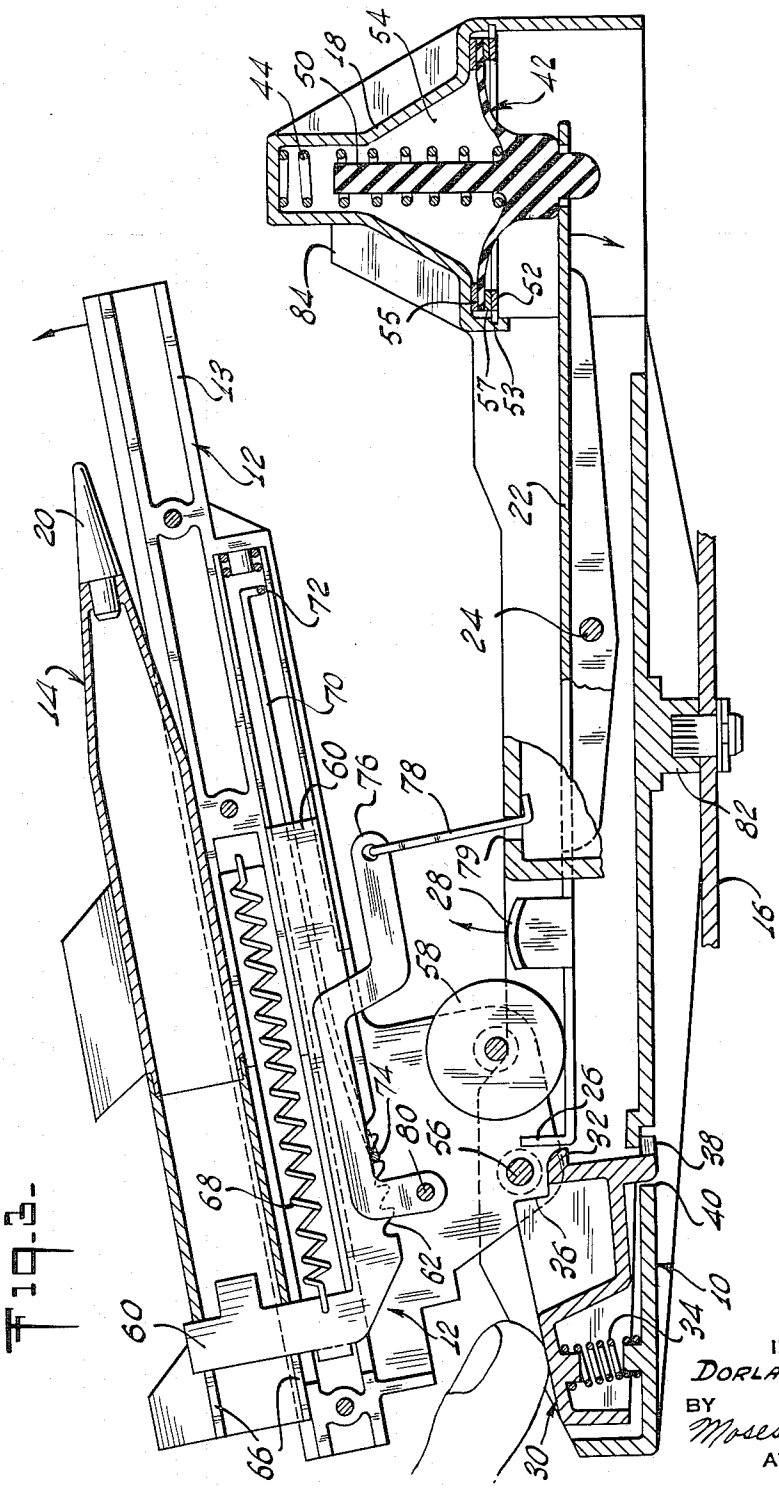

FIG. 3.

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FIG. 4.

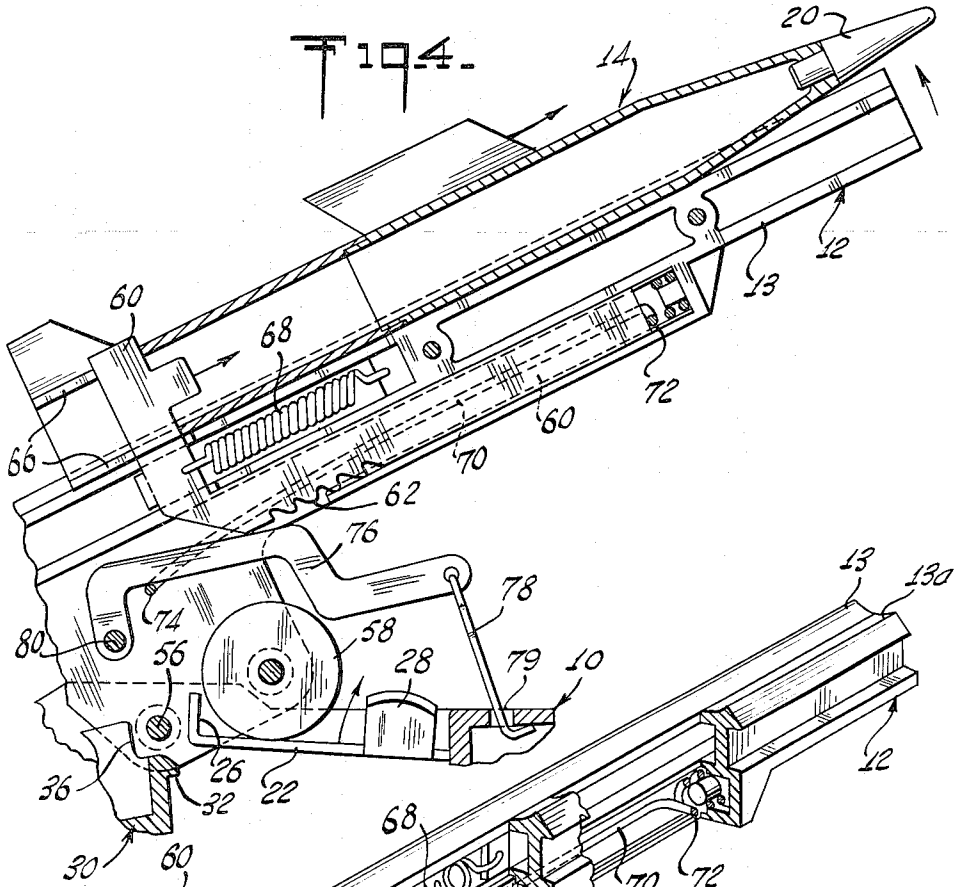
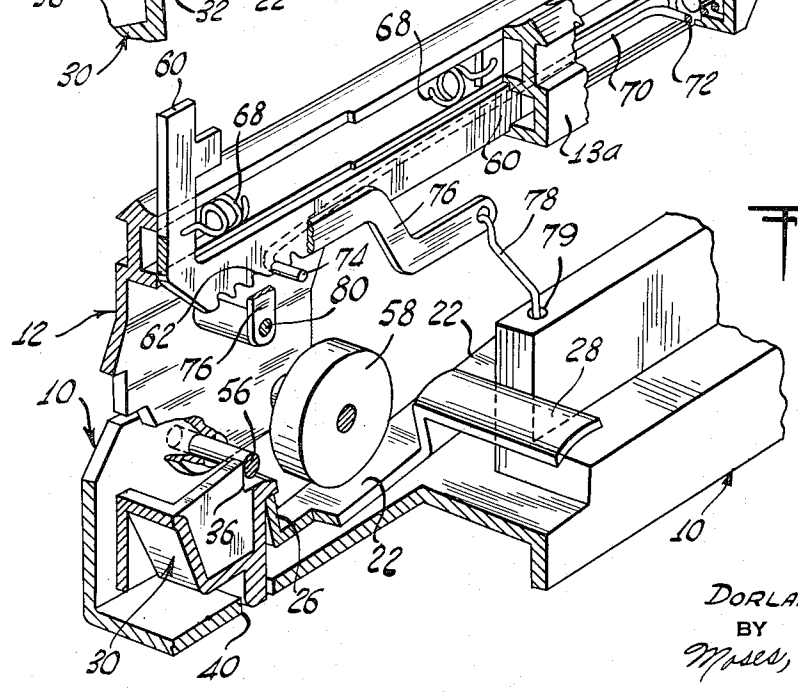


FIG. 5.



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United States Patent Office 3,025,846
Patented Mar. 20, 1962

3,025,846

TOY PROJECTILE LAUNCHER

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Filed Apr. 29, 1960, Ser. No. 25,613
5 Claims. (Cl. 124—26)

This invention relates to toys in general and in particular to novel mechanisms and improvements in toy projectile launching devices.

The present invention is particularly directed to a toy missile launching car patterned after launchers which are kept in a retracted or lowered position until just before firing. When it is desired that a missile be fired a sequence is intiated by the depression of a firing button whereupon the missile launching track gradually elevates to an inclined position. Near the end of the elevation cycle the release of a spring biased impulse mechanism projects the toy missile along the launching track toward any desired target. The novel elevating mechanism is spring actuated and air damped, to slowly raise the launching track through a pivoted, see-saw like, beam arrangement. During the raising of the launching track to the elevated firing position, a linkage secured at one end to the launching track and at the other end to the base is pivoted in such a way as to transfer a latching rod out of engagement with a rack portion of the impulse arm to thereby release the impulse spring and launch the missile.

Repeated firings of the invention may be readily performed by the manual recocking of the impulse arm to any desired range notch, and by resetting the launching track to the lowered horizontal position with the base. In this manner, the launching track is ready for a re-elevating cycle which in turn will accomplish the tripping of the latch portion from the rack portion and thereby release the impulse arm to fire a second missile placed upon the launching track.

In this way, the invention therefore employs a novel impulse arm triggering mechanism in combination with a novel elevating mechanism controlled by an air damped spring biasing elevating means.

An object of the invention is to provide a novel self elevating projectile launching mechanism which will automatically fire the projectile near the end of the launching cycle.

Another object is to provide a launching platform elevating mechanism which raises slowly under the control of an air damped, spring biased diaphragm.

A still further object of the invention is to provide a missile launcher employing a firing control arm which is controlled by the elevation of the launching track.

Still another object of the invention is to provide a spring driven impulse mechanism for a projectile launcher which is settable to a multiplicity of different cocking positions for accomplishing different projectile ranges.

Yet another object of the invention is to provide a novel arrangement of parts to accomplish the realistic simulation of a missile launcher and to provide a toy which is simple in design, realistic in appearance and economical to manufacture.

Other objects and advantages of the invention will become apparent and the invention will be fully understood from the following description and drawings in which:

FIG. 1 is a perspective view of the invention in operation;

FIG. 2 is a side elevation view, in partial section, showing the invention in a cocked and lowered position;

FIG. 3 is a side elevation view in partial section of the invention as the impulse arm is about to be released by the firing control arm;

FIG. 4 is a partial sectional view showing the position of the parts at the end of the impulse arm stroke; and

FIG. 5 is a perspective view with portions broken away showing the mechanism of the invention taken on line 5—5 of FIG. 2.

Referring to the drawings in particular, a base platform **10** is pivotally mounted at **82** to a typical railroad flat-car bed **16**. The platform portion **10** carries a launching track control portion **18** at one end thereof which contains the elevating and air damping mechanism to be described hereafter. Pivotally mounted at the other end of the base **10**, on a hinge pin **56**, is a launching track shown generally at **12** which is comprised of two joined portions **13** and **13***a*. These launching tracks have a curved upper surface which acts as a circular guiding trough or barrel for the directing of a missile shown generally at **14**. The missile has at its forward end a resilient impact tip **20** made of any suitable rubber like material and a vertically disposed slot portion **65** at its rearward end for engagement with an impulse arm **60** slidably located within the launching track **12**.

The base portion **10** contains a longitudinal elevating beam **22** which is pivotally supported at substantially its mid-point on an axle **24**. An aperture **48** at one end of the rocking beam **22** is engaged to a depending ball portion **46** of a resilient diaphragm member **42** which is secured about its outer periphery to the conical end chamber portion **18** by a friction washer and gasket arrangement **52**. The securing ring **52** having a plurality of spaced projecting tab portions **53** abuts a washer **57** and attaches the diaphragm to the bottom of the closed cone like chamber **54** in such a manner as to allow a slow leakage rate of air into and out of the chamber **54**. Air passage to and from the chamber **54** is permitted by the provision of a thin paper washer member **55** which is sufficiently porous to prevent an air tight seal between the chamber **54** housing and the diaphragm **42**. A central spring guide portion **50** is molded to the diaphragm **42** and thereby provides the guide for a coil spring **44**.

The left end of the elevation control beam **22** is provided with an end latching portion **26** which engages a sear portion **32** on the end of a firing button **30** to hold the elevation control mechanism in a cocked position (FIG. 2). The release pad **30**, which acts as the trigger for initiating a launching sequence, is biased in an upward direction by a coil spring **34**. The button **30** is pivoted by the employment of hinge ears **38** extending through aperture **40** so that the sear portion **32** will engage the beam portion **26** whenever the left end of the beam is lowered. A reset or cocking lever portion **28** extending from the elevating beam **22** is provided to allow convenient latching of the beam in this lowered position. The release pad **30** contains a central web stop portion **36** which rests against the hinge pin **56** to limit clockwise rotation of the trigger **30**.

Pivotally supported between the two launching track halves **13**, **13***a*, is a beam roller follower **58** which contacts the end of the elevating beam **22** during the firing sequence. Also between the track halves **13**, **13***a*, supported on a pivot **80** is a firing control arm **76** loosely connected at one end through an operating link **78** and an aperture **79** to the base platform **10**. The firing control arm passes over a bent portion **74** of a latching or cocking rod **70** contained within the launching track halves, **13**, **13***a*. The forward end of the cocking rod **70** is coiled to provide an impact cushion **72** to stop the impulse arm **60** at the end of its forward motion. One end of an impulse spring **68** is secured to the impulse arm **60** while the other end is attached to a suitable portion of the launching track. The arm **60** carries a plurality of rack-like notches **62** on a lower edge thereof which engage

the latch portion 74 of the rod 70. Flattened horizontal stop portions 84 are cut in several of the ribs of the control portion 18 to provide a rest for the lowered track nozzle.

In operation, a missile launching would be initiated from the position shown in FIG. 2. In this state, it can be seen that the left end of the elevation control beam has been lowered and is cocked under the sear portion of the release pad. The elevating control diaphragm is in a raised position and the coil spring 44 is compressed. The impulse arm has been manually cocked to the desired range notch and is held in this position by the rod portion 74. When it is desired to launch the missile, the firing pad 30 is depressed which releases the left end of the beam so that the beam may raise the launching track in a gradual manner through the roller 58. The track is elevated by the spring loaded diaphragm which slowly lowers due to the gradual entrance of air into the chamber 54 which acts to retard the time required for the downward motion of the right end of the elevation control beam. As the launching track is elevating, the firing control arm 26 is raised in an arcuate path about its pivot 80 by its lower contacting relation with bent rod portion 74. As the launching track elevates the firing control link 78 also raises through the aperture 79 to an upward movement limit position shown in FIG. 3. In this position the firing control arm 76 can no longer continue to move in an arcuate path and the holding thereof, while the track 12 continues to raise, causes the unlatching of the rod portion 74 from the range notch 62 to release the impulse arm 60 and thereby launch the missile (FIG. 4). In this manner, it can be seen that the release of the missile has been delayed from the actual time at which the release pad 30 was first depressed, and thereby provides a realistic, self-elevating, automatic toy.

While a specific embodiment of the invention has been shown and described in detail in relation to placement on a toy railway car to illustrate the application of the invention principles, it will be understood that the invention may be embodied otherwise in different type toys without departing from such principles.

I claim:

1. A toy projectile launcher comprising, a base, projectile directing means pivotally mounted upon said base, projectile impulse means carried by said directing means, holding means to maintain said impulse means in an unactuated position, elevation means to pivotally raise said directing means to an inclined firing position, release means responsive to said elevation means to release said holding means, and damping means to control said elevation means to prolong the time required for the elevation means to raise said directing means to an inclined firing position.

2. Apparatus according to claim 1, wherein said damping means employs atmospheric air as the damping medium.

3. Apparatus according to claim 2, wherein said damping means includes a flexible diaphragm portion and wherein said elevation means includes a coil spring within said damping means acting upon said flexible diaphragm portion.

4. A toy projectile launcher comprising, a base, projectile directing means pivotally mounted upon said base, projectile impulse means carried by said directing means, holding means to maintain said impulse means in an unactuated position, elevation means to pivotally raise said directing means to an inclined firing position, said elevation means including a beam portion pivotally mounted for rocking movement upon said base, one end of said beam connected to a portion of said projectile directing means, a flexible diaphragm connected to the other end of said beam, spring bias means urging said diaphragm and said beam end connected thereto in a downward direction, beam latching means to hold said diaphragm in a raised position and compress said spring bias means, said diaphragm forming air damping means to retard the elevation of said projectile directing means upon release of said latching means.

5. Apparatus according to claim 4, wherein said base is pivotally mounted to allow changes in azimuth of said projectile directing means.

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