June 26, 1962 B. C. REED ETAL 3,040,475

TOY

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Fig 1

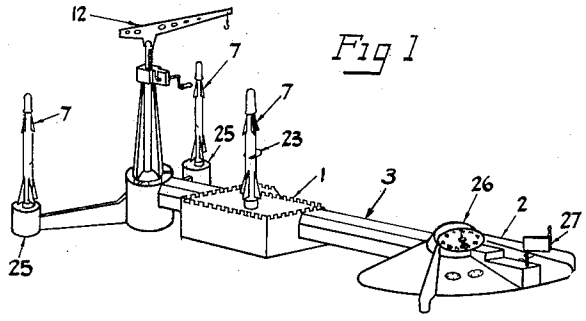


Fig 3

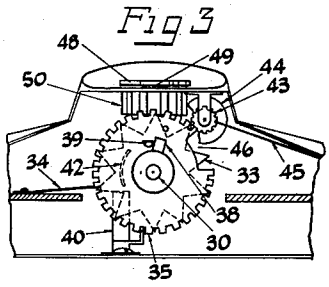


Fig 2

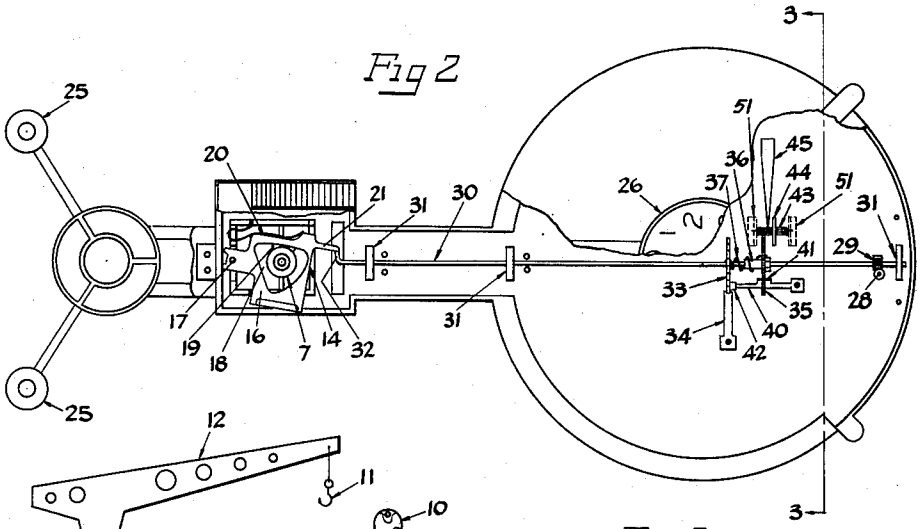


Fig 4

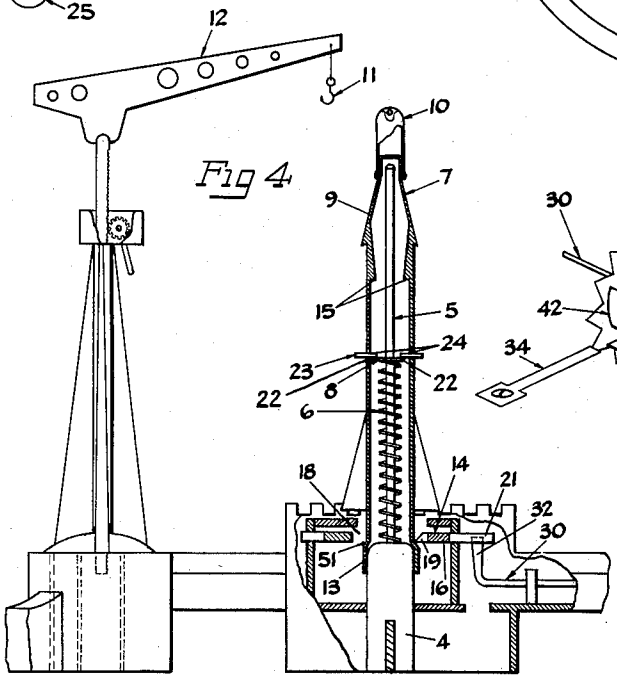
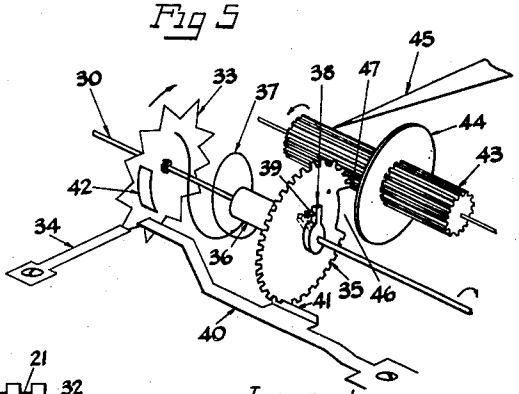


Fig 5



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This invention relates to a toy which realistically simulates, by visual and auditory means, the procedure attendant to the firing of a rocket, projectile, or the like. It is also concerned with devices, useful in such and other toys, for accumulating energy for subsequent abrupt release.

The principal object of the invention is the provision of a new and improved launching toy for the simulation, by visual and auditory means, of the excitement and suspense normally accompanying the preparation for launching of a rocket, projectile, or the like.

The further object of the invention is the provision of a rocket launching toy in which the suspense referred to is climaxed by the physical launching of the rocket accompanied by noise simulating the sound associated with the launching of an actual rocket.

A further object of the invention is the provision of control mechanism for producing the aforementioned effect in a predetermined sequence associated with the launching of actual rockets.

A more general object is the provision of an interesting toy which stimulates the imagination and evokes emotions attendant to the danger and excitement of an actual rocket launching but which in reality is not dangerous in the hands of a child.

A more specific object of the invention is to provide a simple device for accumulating and releasing mechanical energy on a repetitive or cyclical basis.

Other objects and advantages of the invention will be understood from the following description taken in connection with the accompanying drawings which show a preferred embodiment of a launching toy incorporating the invention.

In the drawings:

FIGURE 1 is a perspective view of a rocket launching toy embodying the various features of the invention.

FIGURE 2 is a plan view of the launching mechanism partially broken away to show the launching and sound producing mechanisms.

FIGURE 3 is a sectional view taken on the line 3—3 of FIGURE 2.

FIGURE 4 is a fragmentary side view of the launching site with a rocket ready for launching and with certain parts broken away to show details of the rocket and the launching mechanism.

FIGURE 5 is a fragmentary perspective view of the control and sound producing mechanism.

Briefly, in a toy in accordance with the invention, a projectile simulating a rocket is emplaced on the launching site in firing relation to a suitable propelling device, the release of which is controlled with the accompaniment of visual and auditory effects.

The illustrated toy generally consists of two principal parts, a launching site 1 and a control station 2 which are emplaced on a suitable common base indicated generally by the numeral 3.

The launching site 1 comprises a box-like platform having a central aperture disposed over a boss 4 which may be molded or otherwise fabricated integrally with the base 3. Extending upwardly from the boss 4 is a rod 5, surrounded by a compression spring 6 which provides the energy for launching the rocket 7. The spring 6 may be fastened at its lower end to the boss 4 and is provided at its upper end

with a washer 8 which, in operation, bears against appropriate parts of the projectile 7 to be launched.

The projectile itself consists of a hollow tubular member which may be of molded plastic construction. The nose 9 of the projectile is tapered and fitted with a rubber nose piece 10 which is molded to facilitate engagement with the hook 11 of a crane 12. The projectile is open at its base end to facilitate its emplacement over the launching stem 5, and, as indicated in FIGURE 4, which shows the rocket emplaced and ready for launching, the base end 13 of the tube is flared to provide, on the one hand, a slip fit with the boss 4 which forms the base of the launching stem and, on the other hand, an exterior shoulder 51 for engagement by a detent mechanism 14 which holds the rocket 7 in place against the action of the launching spring 6.

On the inner surface of the projectile near its nose, a pair of opposed bosses 15 normally engage the washer 8 atop the launching spring 6, moving the same downwardly to compress the spring 6 as the projectile 7 is moved downwardly onto the boss 4 for engagement with the detent mechanism 14. Still referring to FIGURE 4, it will be noted that the detent 14 is provided with a sloped surface on its upper side so as to be cammed sidewardly as the projectile is moved downwardly onto the boss 4.

The detent mechanism 14 is shown more particularly in FIGURE 2 as a plate element 16 pivoted at one side, as at 17, to the interior structure of the launching site and having a central aperture 18 for receiving the base of the projectile 7, the projectile-engaging portion of the detent consisting of a lip 19 at one side of the central aperture 18. The detent is normally urged into engagement with the side of the rocket base by means of a leaf spring 20. At the side of the detent plate 16 opposite the pivot 17, there is an arm 21 suitably positioned to be acted upon by the control mechanism to move the detent 14 sidewardly against the action of the leaf spring 20 and thus release the projectile 7.

The amount of energy stored in the launching spring 6 may be varied by providing, in effect, additional bosses 22 which are adjustably positionable on the rocket projectile. As shown in the drawings, particularly FIGURES 1 and 4, the adjustably positionable bosses may be provided by a U-shaped clip 23 of metal or plastic material or the like, which is insertable into slots 24 cut in opposed side walls of the projectile 7 beneath the aforementioned fixed bosses 15 on the interior surfaces thereof. By inserting the clip 23 onto the projectile beneath the fixed interior bosses 15, a greater degree of compression of the launching spring 6 can be obtained and greater heights of projection accordingly attained, as, for example, when the toy is being used out-of-doors.

To simulate realism, storage sites 25 for reserve rockets may be provided as indicated, and the imaginative enjoyment of the child heightened by providing a manually operated crane 12 for transferring the reserve projectiles to the launching site 1.

Exteriorly, the launching control station 2, referring to FIGURE 1, consists of a dial indicator 26 shown as being numbered from "0" to "9," and a small crank 27 by means of which energy for producing the sound attending the "count down" and the launching of the rocket projectile 7 are applied by the child. As will later appear, the turning of the crank 27 is accompanied by movement of the dial indicator 26 and by a ticking or other suitable annunciating noise as each number of the dial is traversed. At the same time energy is stored for abrupt release when the "count down" reaches zero and the detent device 14 retaining the launching spring 6 is released.

These events are accomplished and coordinated by mechanism shown in detail in FIGURES 2, 3 and 5. The

child-operated crank **27** shown generally in FIGURE 1, is mounted on a worm **28** which meshes with a small worm gear **29**, pinned or otherwise secured to a long shaft **30** which extends through the control station **2** to the launching site **1**. The shaft **30** is journalled in suitably spaced bearings **31**, and bent at right angles at its inner end to provide an arm **32** disposed for releasing engagement with the detent **14** at the launching site **1**. One revolution of the shaft **30** is therefore sufficient to trigger the rocket launching detent **14**, the gear reduction between the crank-operated worm **28** and the aforementioned worm gear **29** being appropriately selected to require as much turning of the crank **27** as is deemed necessary to inject suspense into the operation.

The mechanism in which the energy is accumulated and released in the "count down" procedure earlier described, is best understood from FIGURE 5, and in the description thereof it will be assumed that a rocket is in place for launching and that the dial indicator **26** reads "9" for the beginning of the "count down."

Keyed or otherwise secured to the long shaft **30** is a star wheel **33**, the teeth of which are disposed, by clockwise rotation as indicated in FIGURE 5, to successively engage a reed **34** secured to the base **3**. As each point of the star wheel **33** in succession engages the reed **34**, the free end of the latter is displaced and abruptly released to create a sharp noise which coincides, in a manner, still to be described, with the traversal of each number on the dial indicator.

Rotatively journaled on the same shaft are a segmental gear **35** and a bushing **36** which is integral with that gear and serves to steady it. The segmental gear **36** has a notched out section **46** extending a short distance around its periphery, the function of which will later be made clear.

A torsion spring **37**, the ends of which are connected to the star wheel **33** and to the segmental gear **35**, surrounds the shaft **30** between star wheel **33** and the gear **35**. Also secured to the shaft **30** for rotation therewith, and on the side of the segmental gear opposite the star wheel, is a stop finger **38** which is disposed to be engaged by a pin **39** extending axially from the adjacent face of the segmental gear. The torsion spring **37** is desirably compressed a slight amount axially in order to maintain facial engagement of the segmental gear with the stop finger **38**.

A spring leaf **40**, secured to the base of the toy and extending generally in a direction parallel to the long shaft **30**, is provided with a sideward extension which is upturned to form a detent **41** engageable with the teeth of the segmental gear **35** to secure it against rotation when the long shaft **30** is turned. Thus, the turning of the star wheel **33** by the long shaft **30** with the segmental gear held by the detent, serves to store energy in the torsion spring **37**.

The release of the energy stored in the spring **37** is accomplished when a cam projection **42**, affixed to the star wheel on the face adjacent the segmental gear, is rotated into engagement with the free end of the leaf spring **40** which carries the detent **41** which normally restrains the segmental gear **35**. The depression of the spring **40** frees the segmental gear **35** for rotation under the action of the torsion spring **37**. The star wheel **33** is secured against reverse rotation by the irreversible drive connection between the worm gear **29** and the input worm **28**, but if another form of input connection is desired, the annuncitator reed **34** is adequate to prevent undue backlash of the star wheel.

While energy is being accumulated in the torsion spring **37** by the turning of the star wheel **33** by the shaft **30** for one revolution, and while the segmental gear **35** is maintained in place, the stop finger **38** secured to the shaft rotates with the star wheel to a new position (shown in dotted lines on FIGURE 5). In its new position it provides a limiting abutment which restricts the rotation of the segmental gear to slightly less than one revolution.

Referring still to FIGURES 2 and 5, it will be seen that there is mounted for rotation on an axis parallel to the long shaft **30** an elongated small gear **43** in meshing engagement with the segmental gear **35**. Intermediate its ends and displaced axially from the point of engagement with the segmental gear **35**, the elongated gear **43** is fitted with an inertial disc **44**, the purpose of which will subsequently become clear. The elongated gear **43** is suitably journalled in bearing brackets **51** secured to the base of the toy **3** as indicated in FIGURES 2 and 3. Similarly fixed to the base of the toy **3** is a reed **45**, the free end of which engages the elongated gear **43** to be vibrated in response to the rotation of the latter. It is the last mentioned reed **45**, activated by rotation of the elongated gear **43**, which produces the sound attendant to the launching.

As shown in FIGURE 5, which illustrates the relative positions of the respective parts at the beginning of the "count-down" preparatory to the rocket launching, the elongated small gear **43** and the segmental gear **35** are engaged, the notched out portion **46** of the segmental gear being disposed immediately below the zone of engagement **47** of the two gears. Thus, when the segmental gear is subsequently released for rotation under the driving force of the torsion spring **37**, the elongated gear **43** with its inertial wheel **44** is accelerated until the notched out portion **46** of the segmented gear reaches the zone of engagement **47** of the two gears. At that stage, the stop pin **39** extending axially from the face of the segmented gear has struck and is held by the stop finger **38** on the long shaft **30** to prevent reengagement at that time between the segmental gear and the elongated gear **43**. The latter and its inertial disc **44**, accelerated to high speed, continue in motion of their own momentum and until their energy is absorbed by the sound-producing reed **45**.

Referring to FIGURE 3, which is a sectional view through the control station, it will be seen that the sweep hand **48** of the dial indicator **26** is formed integrally with or otherwise secured on a vertical axis **49** to a simple gear **50** which is disposed for meshing engagement with the star wheel **33** as the latter rotates. The size of the gear **50** attached to the sweep hand **48** is preferably selected, relative to the space between successive teeth on the star wheel **33**, so that the motion transmitted to the sweep hand is intermittent, i.e., each successive tooth on the star wheel moves the sweep hand from one number on the dial to the next and disengages itself from the gear **50** attached to the sweep hand, leaving a new tooth of the same gear **50** to be engaged by a subsequent tooth of the star wheel a measurable time later, during which time the sweep hand and its driving gear have remained stationary.

From the foregoing description, it will be understood that to operate the toy, the child places the projectile **7** over the launching stem, depressing the rocket, and compressing the launching spring **6** until the detent **14** housed in the launching site **2** assumes holding engagement with the shoulder **51** formed by the flaring base **13** of the rocket. The respective parts of the control mechanism, it will be assumed, occupy the starting position depicted in FIGURE 5, the dial indicator pointing to the number "9."

To begin the "count down," as earlier explained, the child simply turns the crank **27**. As the long shaft **30** is thereby turned, carrying with it the stop finger **38** and the star wheel **33**, the count is ticked off by the reed **34** and indicated on the dial indicator **26**, and energy is simultaneously stored in the torsion spring **37** inasmuch as the segmented gear **35** is restrained by the detent **41**. When the star wheel has made approximately one revolution the cam **42** which it carries depresses the free end of the detent-carrying spring **40**, releasing the segmental gear for rotation under the force of the torsion spring **37**, the

opposite end of which is held fast by the star wheel. The rotation of the segmental gear through somewhat less than one revolution, as earlier described, transmits to the elongated gear 43 and its inertial wheel 44 the energy added to the torsion spring 37 by the rotation of the star wheel, and the reed 45 is vibrated to produce sound to accompany the launching of the rocket. It will likewise be understood that the rotative position of the cam 42 on the star wheel is coordinated with the triggering arm 32 at the end of the long shaft 30 so that the creation of the sound occurs simultaneously with, or preferably slightly in advance of, the release of the rocket.

In order to impart a high level of energy to the inertial wheel 44, the torsion spring 37 is preferably prestressed in the assembly of the respective parts and the notched out portion of this segmental gear 35 is made as small as possible to maximize the period of contact.

The prestressing of the spring 37 also serves to maintain the stop pin 39 on the segmental gear firmly against the back of the stop finger 38 to prevent backlash and subsequent reengagement of the segmental gear with the elongated gear after the latter has been accelerated.

By means of the relatively simple mechanism described, the procedures and effects associated by the child with the launching of rockets are simulated to a highly satisfactory degree, and then may be expected to provide many hours of enjoyment for children over a rather wide age spread. While the mechanism itself may be beyond the capacity of the small child from the standpoint of dismantling and tinkering, it is simple in operation and sufficiently rugged for satisfactory duration.

Moreover, it is believed that the portion of the control mechanism which is adapted to gradually accumulate and abruptly release stored energy in a predetermined sequence or cycle, has application beyond the specific embodiment shown and may be utilized in other forms of toys.

The features of the invention believed novel and patentable are set forth in the following claims.

We claim:

1. A projectile launching toy comprising, a launching spring, a detent for maintaining said launching spring in launching condition, manually operated control means operable through a fixed cycle for releasing said detent at a predetermined point in said cycle, torsion spring means connected to said control means and adapted to be stressed by said control means and subsequently released thereby in each said cycle in predetermined relation to the release of said detent, a rotary driving member connected with said torsion spring means to be driven thereby upon said release thereof, a driven rotary member drivingly engaged with the said driving rotary member for only a predetermined portion of the rotation of the driving member, means for stopping the rotation of the driving member after its disengagement from the driven member, means for converting the rotational energy imparted to the driven member into sound, and means operated by the control means for indicating the condition of the latter.

2. A projectile launching toy comprising, a base, a launching guide on said base for receiving a projectile, a compression spring connected to said guide and adapted when compressed to propel the projectile, a launching detent on the base for maintaining said launching spring compressed, a control shaft journalled on the base and having an arm disposed for operative engagement with said launching detent to release said spring, means for rotating said shaft, a torsion spring surrounding said shaft and having one end fixedly connected for rotation therewith, a segmental gear rotatively journalled on said shaft, and being secured to the opposite end of said torsion spring, a second detent means normally restraining the rotation of said gear, a member secured to said shaft and adapted to release said detent means in predetermined relation to the release of said launching detent, a second gear having high inertia and being rotatively journalled on the base for meshing engagement by the toothed portion of the segmental gear, a reed engaged with said second gear for vibration by the rotation thereof, a second member secured to said shaft and adapted to halt the rotation of said segmental gear after the toothed portion of the latter rotates sufficiently to disengage itself from said second gear, and indicating means connected with and operated by the rotation of said shaft for indicating the rotative position thereof.

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