Jan. 8, 1957 W. H. FORD 2,776,525

LEAPING FIGURE TOY

Filed March 29, 1954

FIG-1

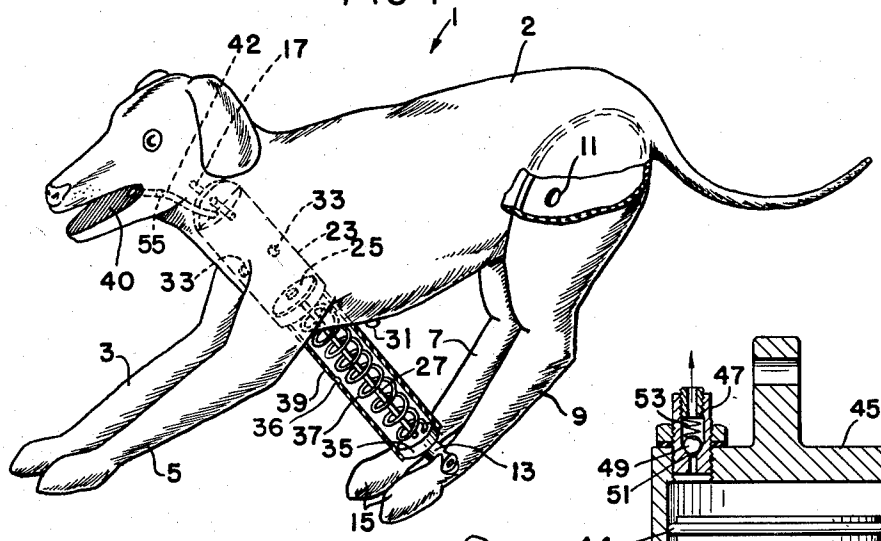


FIG-5

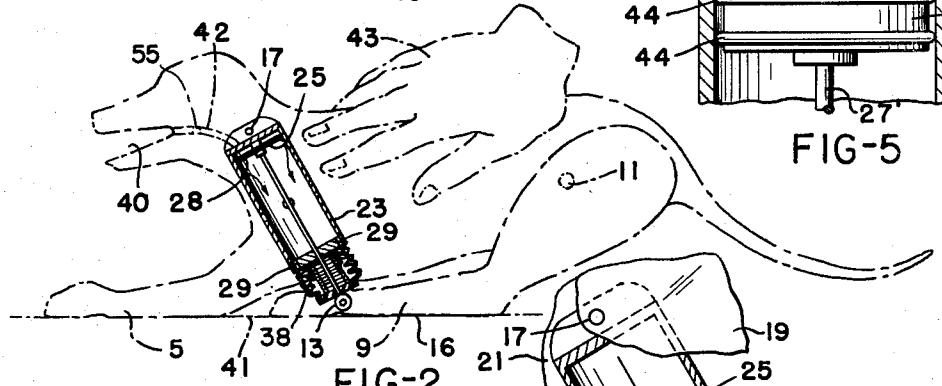


FIG-2

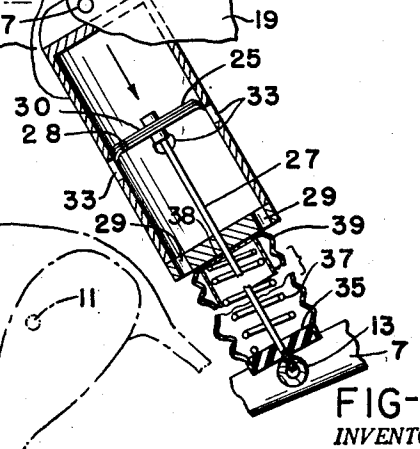


FIG-4

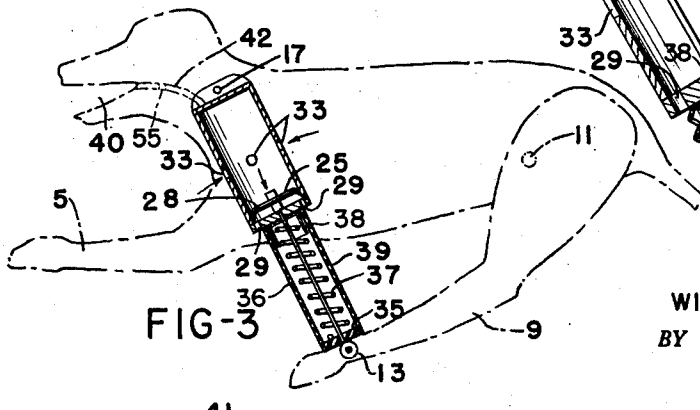


FIG-3

41

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LEAPING FIGURE TOY

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4 Claims. (Cl. 46—129)

My present invention relates to a spring actuated mechanism particularly adapted for novelty devices in the form of leaping figure toys.

The invention has for a primary object the provision of an animal-simulating toy which is capable of controlled movement including a movement prior to actual leaping. Thus the structure of invention imparts to a leaping figure toy, for example, two motions; the first is a slow movement which resembles an animal setting itself prior to leaping, and the second motion is that of the leap itself.

An important object of the invention is the provision of means for cushioning the action of the spring of the device to avoid the usual explosive spurt of action common to devices having a single kick-up or snap action release such as are found in the mouse trap and vacuum cup arrangements. The tendency present in the latter devices to frighten children is minimized or substantially eliminated in embodiments of the present invention due to the initial slow warning motion of the spring.

A principal object of the invention is the provision of a novelty device in the form of a leaping figure toy provided with a spring acting mechanism having a positive controllable time delay period preceding the release of the major portion of the spring energy for simulation of movement of an animal in effecting a leap.

Another object of the invention is the provision of a spring actuated leaping figure toy, the actuation of the spring of which is controlled by air flow and which flow is capable of providing a sound effect as well as a cushioning action to the toy.

Yet another object of the invention is the provision of a leaping figure toy, the direction and characteristics of the leap of which may be controlled by the constructional arrangement of the parts of the toy.

For the purposes of disclosure of the principles of this invention a toy in the form of a dog has been selected for illustration in the accompanying drawings which form a part of this specification, but it is to be understood that such is representative only and not limitative of the applications to which the device of invention may be directed.

In the drawings:

Figure 1 is a perspective view of a toy constructed and arranged in accordance with the invention having parts broken away to illustrate the actuating mechanism and to show the fabric covering of the toy;

Figure 2 is a side elevational view of the toy of Figure 1 illustrating the manner of setting the mechanism for actuation in accordance with the principles of this invention;

Figure 3 is a side elevational view of the toy of Figure 1 in the actuated condition thereof at a point near the conclusion of a leap;

Figure 4 is a sectional view illustrating the arrangement of the principal parts of the mechanism of invention; and

Figure 5 is a sectional view illustrating a modification of the invention.

Referring to the drawings the toy indicated generally at **1** has a body portion **2** in the general configuration of a dog. Numerals **3**, **5** indicate the fore legs and numerals **7**, **9** designate the rear legs of the animal. Legs **7**, **9** are pivoted to the body **2** at **11** for movement as a unit and the lower portion of these legs is connected together by a rod **13** passing between the legs and journaled therein.

The rear paws **15** are preferably constituted of soft rubber or other appropriate material capable of frictionally engaging a flat surface to prevent premature movement of the animal in the set condition of the actuating spring and to improve the nature of the leap. Soft rubber or other frictional material may also be provided on the legs at **16** (Figure 2) for the same purpose and such may be formed to simulate in appearance the skin of the animal.

The body and leg portions are suitably formed of rigid wooden members covered by an appropriate material having a degree of flexibility sufficient to permit the functioning of the toy; for example, the rigid members may be covered with a fabric, pile fabric or rubber. However, if desired the structure may be of plastic or metal and the invention is not limited to any particular material or design with respect to the rigid members or the covering therefor.

The body portion **2** is preferably hollow to an extent at least sufficient to provide for the receipt of the actuating mechanism as described, although if desired the body may be substantially completely hollow. Adjacent the neck of the animal on the interior thereof in the hollow is a cross bar **17** which is itself pivotally secured for movement in opposing side frames **19**, **21** (Figure 4) of the body portion **2**. Secured to the cross bar for free pivotal movement therewith in the hollow is a cylinder **23** provided with a piston **25** having a piston rod **27** extending downwardly and projecting through the lower wall portion of the cylinder.

The piston is itself provided with a very tiny pin hole aperture **28** (Figure 4) through which air may leak slowly. The ring **30** of the piston is of leather or other flexible material and is turned downwardly to permit the flow of air around the piston as the piston moves upward relatively to the cylinder (see arrows Figure 2), but is so formed, as may be clearly seen from Figure 4, as to inhibit the flow of air from the lower portion of the cylinder to the upper portion in the downward passage of the piston relative to the cylinder. A ring of leather alone or a ring of leather impregnated with oil is eminently satisfactory for the purpose, although fabrics or rubber or other materials of sufficient strength and wear resistant qualities may be employed.

The cylinder **23** is itself closed at the upper end and is provided with ports **29** at the lower end, which ports communicate with the atmosphere. The ports may be directly in the atmosphere, in which case the lower portion of the piston may be beneath the animal, or, as in the present instance, the cylinder may be wholly within the body of the animal; in this case a valve or opening **31** may be provided in the lower portion of the animal body to permit the free access of air to the interior if the body is otherwise airtight. However, in most instances, whether the major portion of the body **2** is hollow or solid, some air leakage will take place into the interior housing to permit air to flow through the ports **29** to the interior of the cylinder.

The cylinder **23** is further provided with a plurality of openings **33** about a portion of the periphery thereof between the cylinder ends, and these openings in the present instance are shown about midway of the length of the cylinder wall; and neither the size, the number or location of the openings is critical, but they must be of sufficient size to permit air to flow readily therethrough,

in contrast to the slow flow of air through the pin hole aperture of the piston. The hollow in which the cylinder rests, as already noted, is sufficiently large to permit movement of the cylinder therein and accordingly openings 33 are really communicable with the atmosphere within the hollow.

The lower portion of the projecting piston rod 27 is secured to the cross rod 13 for pivotal movement thereof with respect to the rear legs 7, 9 of the animal. Secured on the piston rod above the cross rod is a grommet 35 which is preferably of a resilient material such as soft rubber, and this grommet resiliently retains the lower end of compression spring 37. The upper end of spring 37 (Figure 4) is suitably provided with a metal grommet 38 which receives the spring end and bears against the cylinder base, the piston rod 27 passing through an aperture of this metal grommet to retain the same and the spring with respect to the rod.

Surrounding the spring and secured between the under portion of the body 2 and the grommet 35 is a spring housing 39, apertured at 36 for free air flow into and out of the housing; the housing may be simply a fabric or a rubber member which is of sufficient length to be compressed and extended with the spring 37; the same is not necessary to the practice of the invention but is effective to cover the spring from view and to eliminate direct contact therewith as well as to hinder the entry of foreign matter.

Extending between the upper end of the hollow which houses the cylinder 23 and the mouth of the animal at 40 is a narrow passage 42 the purpose of which will become more apparent hereinafter.

In the operation of the device shown in Figures 1–4, the toy is suitably supported as at 41 (Figure 2) and the body portion 2 (Figure 1) is pushed down to the position shown in the former figure. Pressure of the hand 43 causes the body portion 2 and the cylinder 23 to move downwardly relatively to the piston 25 compressing the air above the piston, which air then flows down around the piston ring 30 to create a vacuum pressure on the side of the piston which is uppermost. Simultaneously the cylinder bears against the spring 37 and compresses the same (Figure 2); the air pressure on the lower side of the piston is atmospheric and the differential pressure across the piston normally would retain the spring compressed, but this differential pressure is slowly lessened, when the hand 43 is removed, by leakage of air through pin hole 28 to the vacuum spacing on the upper side of the piston. This change in pressure differential causes the piston 25 to move slowly downwardly relative to the cylinder 23—or viewed somewhat differently the cylinder itself is caused to move upwardly relatively to the legs of the animal, as the internal air pressure on the upper end of the cylinder increases. Thus effectively the combination of the cylinder and piston is slowly lengthened out from the Figure 2 position and simultaneously the spring 37 relaxes very slowly, the body portion 2 moving upwardly with the cylinder, with the paws of the animal remaining firmly gripped on the surface 41.

As the openings 33 traverse the piston pressure on the upper side of the piston is suddenly raised to atmospheric by the rapid entry of air, and since the pressures on both sides of the piston, due to the air, are then equal, the spring pressure acting upon the cylinder is substantially unrestrained and sudden upward movement of the spring at an increased rate throws the cylinder and the toy as a whole into the air upwardly and forwardly.

The free pivotal movement of the cylinder, piston and spring assembly facilitates this action materially and substantially the only restraining influence is the weight of the novelty device.

Referring briefly to Figure 5 there is shown therein a modification of the structure of invention with respect to the portion of the mechanism which includes the means for the development of the vacuum pressure and the slow relieving thereof.

In Figure 5 cylinder 23′ is provided with piston 25′ and rod 27′ the rings 44 which may be of metal and substantially unyielding in the manner of normal piston rings. In the cylinder head 45 there is provided a valve having a body portion 47 which body portion has an aperture which is normally closed by a ball 49 provided on the seat 51 and retained and positioned in the seat by the pressure of spring 53.

Relative movement of the piston 25′ with respect to the cylinder 23′ causes air to be exhausted from the top of the cylinder above the piston. The valve seat or the ball may be nicked or slightly grooved to permit a slow return of air therethrough upon such evacuation. Thus the structure is capable of developing a vacuum and permitting a slow breakage of the vacuum.

With respect to this structure it is to be noted by placing a finger, for example, over the port of the valve the vacuum could be maintained and the spring compressed for any desired period after setting of the device. Similarly the time period may be controlled by utilizing a suitable needle valve, positioned for example in the cylinder side wall or cylinder head and effective to replace the pinhole aperture 28 or the valve of Figure 5.

Various modification of the embodiment set forth may be employed to achieve specifically desired results; the relationship of the legs, the location of the center of gravity of the toy, the position of the cylinder and spring, the location of the pivot point of the cylinder and piston rod, as well as the location of the pivot point between the rigid elements constituting the body portion and the legs, may be readily altered to accommodate the structure to a particular type of animal and to secure a particular effect. For example, the animal may be made to leap upwardly and forwardly, only upwardly, or may be arranged to give a substantially horizontal motion to the novelty. Thus the device is useful with animal novelties in general and particularly is useful with those such as the kangaroo, a donkey which kicks, and is of course of primary importance in connection with any animal which sets itself prior to effecting a leap or kick.

As a further modification of the invention as particularly applied to animals, the opening of the cylinder, or the valve, or the constricted passage 42 may suitably have secured therein at 55 a device which emits sound when air flow therethrough takes place, and such device may be caused to emit a sound characteristic of the particular object, at a suitable time period in the actuation of the device. More specifically the toy dog of Figure 1 may be caused to growl prior to the leap when setting the spring by the positioning of a sound device at the edge of the valve of Figure 5, for example.

The mode of operation of the mechanism may also be varied for the spring may be tensed rather than compressed by the initial actuation of the rigid elements, the spring being released in the same manner as already described, by breakage of the vacuum. Further the spring may be positioned within the cylinder for actuation if so desired.

The pivoted cylinder, piston spring assembly provides for considerable flexibility in the devices which are in the form of animals for the upper pivot may be mounted in any of several locations to provide different angular relationships of the assembly with respect, for example to the limbs of the toy of the drawings; similarly the limbs may be lengthened or shortened to provide desired arrangements of the lower pivot.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. A leaping figure toy comprising relatively rigid body

and limb portions secured pivotally together adjacent a rearward end of the figure, and secured within a forward open end of the figure between the body and limb portions a cylinder and a piston therein, a piston rod projecting from the cylinder, the cylinder being pivotally secured to the body portion and the piston rod being pivotally secured to the limb portion, a coil spring surrounding the piston rod and having one end slidable thereon, the other end being supported by the piston rod for movement therewith, said spring being between said cylinder and limb portion, means to develop a vacuum upon one side of the piston upon relative movement in one direction of the cylinder and piston to stress the spring, means to leak air from the atmosphere slowly into the vacuum thus created to reverse the relative movement of the piston and cylinder and to partially relax the spring and urge said body and limb portions apart, and means to thereafter equalize the pressure upon opposite faces of the piston quickly to completely relax the spring and urge said body and limb portions apart rapidly to cause said figure to leap into the air, said latter means including ports in the cylinder side wall and in the cylinder end which said piston approaches in effecting the equalization of pressures, the ports being freely communicable with the atmosphere.

2. A leaping figure toy comprising body and limb portions pivotally secured together adjacent a rearward end of the figure, and secured within a forward open end of the figure in the body portion a cylinder having a piston therein, a piston rod projecting from the cylinder downwardly and rearwardly toward the limb portion, the cylinder being pivotally secured to the body portion and the piston rod being pivotally secured to the limb portion, a coil spring outwardly of the cylinder surrounding the piston rod and having an upper end slidable on the piston, the lower end being supported by the piston rod for movement therewith, means to develop a vacuum upon the upper side of the piston upon relative movement of the cylinder downwardly with respect to the piston to compress the spring, means to leak air slowly into the vacuum thus created to reverse the relative movement of the piston and cylinder and to partially relax the spring and urge said body and limb portions apart, and means operable upon said relative movement to equalize the pressure upon opposite faces of the piston quickly to completely relax the spring and urge said body and limb portions apart rapidly to cause said figure to leap upwardly and forwardly into the air, said means to equalize the pressure including ports in the cylinder side wall and the cylinder end towards which said piston moves in said equalization, said ports being communicable with the atmosphere.

3. A leaping figure toy comprising an animal simulating frame having a substantially rigid body portion and substantially rigid limb means pivotally secured together adjacent the rearward end of the frame, said limb means extending beneath the body portion, and spring actuated mechanism connecting said limb means and body portion together forwardly of the frame and normally urging said body portion and limb means apart, said spring actuated mechanism including a fluid pressure cylinder having a piston therein and a spring operably connected

to the piston and cylinder and being stressed by relative movement between the piston and cylinder, said cylinder having one end in communication with the atmosphere and the said cylinder and piston being arranged whereby relative movement between the cylinder and piston in one direction creates a vacuum in the cylinder space behind said piston and simultaneously positions the body portion of said toy downwardly adjacent said limb means, said spring actuated mechanism including means to leak air slowly into the said vacuum cylinder space to cause said piston to creep and to slowly relax said spring from a stressed condition and cause said toy body portion to move upwardly relative to said limb means and simulate the movement of an animal just before making a leap, said spring actuated mechanism including port means of substantial size in said cylinder communicable with the atmosphere and traversable by said piston in slow movement thereof to equalize the air pressure on opposite sides of said piston to bring about the full action of said spring and cause said toy as a whole to leap into the air in simulation of an animal leap.

4. A leaping figure toy comprising an animal simulating frame having a substantially rigid body portion and substantially rigid limb means pivotally secured together adjacent the rearward end of the frame, said limb means extending beneath the body portion, and spring actuated mechanism connecting said limb means and body portion together forwardly and normally urging said body portion and limb means apart, said spring actuated mechanism including a fluid pressure cylinder having a piston therein and a piston rod connected thereto and extending from said cylinder, a spring operably connected to said piston rod and cooperable with the piston and cylinder to be stressed by relative movement between the piston and cylinder, said cylinder and piston being arranged such that relative movement between the cylinder and piston in one direction creates a vacuum upon the one side of the said piston and simultaneously positions the body portion downwardly adjacent the limb means, said spring actuated mechanism including first means to leak air slowly into the said vacuum on one side of said piston to initially slowly move said piston and to slowly relax said spring from a stressed condition to move the body portion slowly upwardly relative to the limb means to simulate movement of an animal in setting itself prior to effecting a leap, and said spring actuated mechanism also including port means of substantial size in said cylinder communicable with the atmosphere and traversable by said piston in slow movement thereof to equalize the air pressure on opposite sides of said piston more quickly to relax said spring to cause said toy as a whole to leap into the air in simulation of an animal leap.

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