July 1, 1958 L. L. GREEN 2,840,951

BALLOON POWERED TOY

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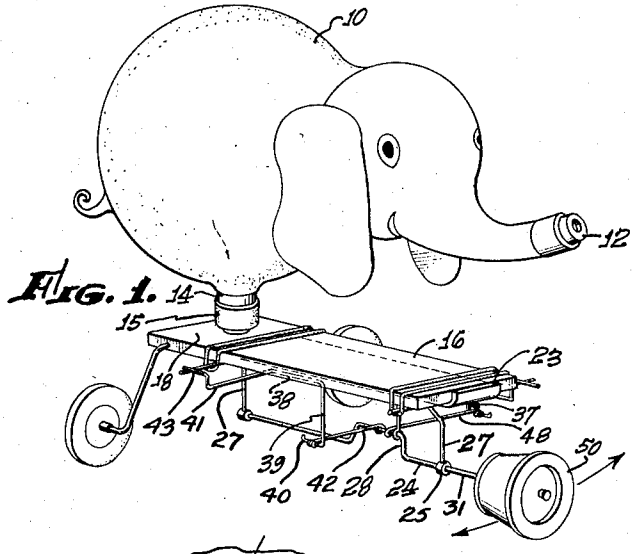


FIG. 1.

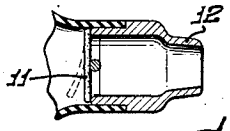


FIG. 3.

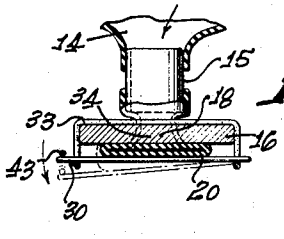
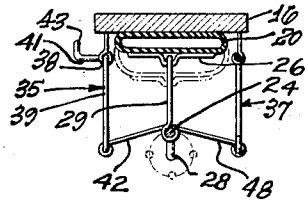


FIG. 4.

FIG. 5.



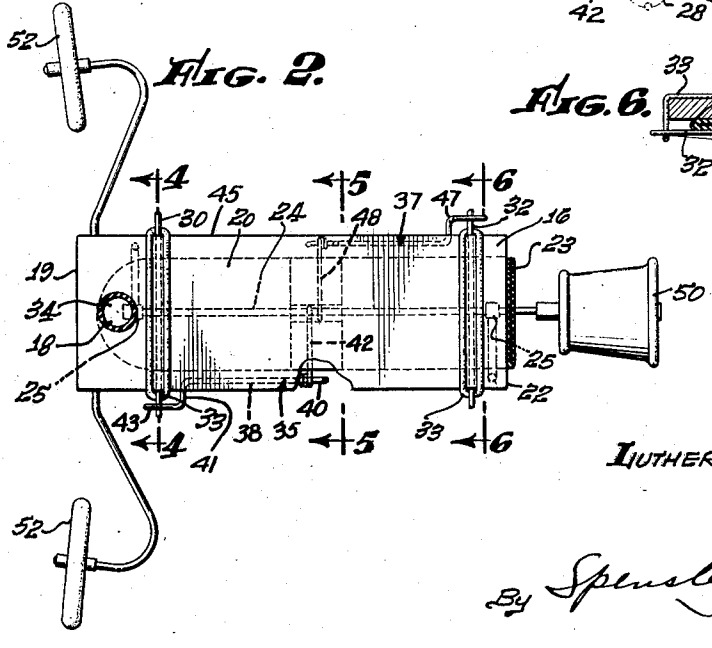


FIG. 2.

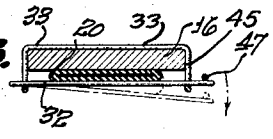


FIG. 6.

LUTHER L. GREEN,

INVENTOR.

By Spensley and Horn

ATTORNEYS

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BALLOON POWERED TOY

Luther L. Green, Los Angeles, Calif.

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2 Claims. (Cl. 46—206)

This invention relates to self propelled toys and more particularly to an air operated self propelled vehicular toy.

It is an object of the present invention to provide an improved air operated motive means for propelling wheeled toys.

It is another object of the present invention to provide a toy which may be provided in any desired configuration and which is propelled by a decorative inflatable balloon.

It is a further object of the present invention to provide a vehicular toy which may be simply and inexpensively manufactured.

The present invention comprises an inflatable balloon as an air reservoir which is affixed to a vehicular base. An expansible tubular extension extends through the base and is affixed to the underside thereof. Automatic valving means are provided by which air is pulsed through the tube to cause a crankshaft connected to the tube to rotate and furnish motive power to a power wheel of the toy.

The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages thereof, will be better understood from the following description considered in connection with the accompanying drawing in which a presently preferred embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawing is for the purpose of illustration and description only and is not intended as a definition of the limits of the invention.

In the drawing:

Figure 1 is a view in perspective of an illustrative embodiment of the present invention;

Figure 2 is a top plan view of the vehicular portion of the toy of Figure 1;

Figure 3 is an enlarged view of the air inlet valve of the balloon portion of the toy;

Figure 4 is an enlarged partial sectional view of the air inlet valve to the motor portion of the vehicular toy, taken along line 4—4 of Figure 2;

Figure 5 is an enlarged partial sectional view taken along line 5—5 of Figure 2; and

Figure 6 is an enlarged partial sectional view taken along line 6—6 of Figure 2.

Referring now to the drawing wherein like reference characters designate like or corresponding parts throughout the views and particularly to Figures 1 and 2, the presently preferred embodiment of the invention comprises an inflatable balloon **10** which is connected to, and which furnishes the motive power for, the vehicular portion of the toy. The balloon can be made to any ornamental design or any configuration desired to be simulated, for example; birds, animals, airplanes, as a basis for the toy. In addition, the vehicular portion may also be equipped with an outer shell of a desired configuration or design, or may be left only functional, as shown in the illustrative embodiment.

In this embodiment the balloon **10** is formed in the shape of an elephant. Referring to Figure 3, an air inlet valve **11** and mouthpiece are provided to allow the balloon to be inflated by mouth. The air inlet valve **11** is a check valve of a type well known to the art to allow inlet of air, but to prevent escape of air from the balloon at the inlet. The air check valve **11** shown is a flexible flutter type valve. At another appropriate location on the balloon an air outlet **14** is provided and is, in this embodiment, affixed to the vehicular portion of the toy.

Referring now particularly to Figures 2 and 4, the vehicular portion of the invention includes a base **16** defining an opening **18** therethrough proximate a first end **19** of the base. The nipple **15** to which the air outlet **14** of the balloon is affixed, is positioned above the opening **18**. An elongated tubular inflatable member **20** is affixed to the opposite end of the nipple and extends through the opening in the base. The inflatable tube **20** furnishes the motive force of the toy as described hereinafter and is, in effect, a tubular extension of the balloon. Although, in this embodiment the tubular member is a separate element connected to the balloon through the nipple, it may be formed as an integral part of the balloon. The end of the inflatable tube **20** opposed to the end which is affixed to the nipple, is positioned and affixed proximate the second end **22** of the base. The end of the tube **20** is open and thus provides an exhaust **23** for the air to be released from the balloon.

Since the tube **20** is inflatable, it is flat and rectangular in the deflated or exhausted condition, while in the inflated condition it seeks to assume a circular cross-section. Although the inflatable tube in the embodiment shown is left free between the opening **18** and the second end **22** of the base, the upper side of the tube **20** may be affixed to the underside of the base by adhesives or otherwise. In order to assure the rectangular deflated configuration of the tube **20** it is preferable to subject the tube to a slight amount of tension as the outer end **23** is affixed to the base **16**.

A crankshaft **24** is rotatably mounted beneath the base **16** substantially along the longitudinal centerline of the base. The crankshaft is mounted in bearings **25** suspended beneath the base by means of support arms **27**. The outer end **31** of the crankshaft extends through the outer bearing **25** beyond the outer end **22** of the base **16**. A crank arm **28** is formed in the crankshaft **24** at a longitudinal position approximately midway between the air inlet **34** of the tube **20** and the outer end **22** of the base.

A first air passage control valve **30** and a second air passage control valve **32** are resiliently mounted across the underside of the base and underside of the tube **20** to exert closing force upon the tube **20**. Referring to Figures 1, 2 and 4, the first air valves **30**, **32** are each formed of a rigid wire member and are positioned transverse to the tube **20**, i. e. substantially normal to the centerline of the base **16** and tube **20**. The valve members **30**, **32** are each of substantially greater length than the width of the base, thus having two ends extending beyond the sides of the base. A resilient band **33**, such as a rubber band, is looped over the upper side of the base and over the ends of the valve members **30**, **32** to urge the valve upward against the inflatible tube to pinch it closed to the passage of air. The first air control valve **30** is positioned longitudinally proximate the air inlet **34** to the tube between the air inlet **34** and the crank arm **28**. The second air control valve **32** is positioned proximate the air exhaust **23** of the tube between the crank arm **28** and air exhaust **23** to resiliently urge a closure of the tube at this position.

The valve members **30**, **32** are actuated from a closed to open position as described hereinafter by a first actu-

ator member 35 and a second actuator member 37. The first actuator member, referring to Figures 1, 2 and 5, includes a horizontally extending portion 38 rotatably mounted upon the underside of the base and extending parallel to the crankshaft from a position proximate the first valve 30 to a position proximate the longitudinal position of the crank arm. A substantially vertically extending portion 39 of the actuator member 35 is integrally affixed to the horizontal portion 38 and extends normal thereto to a position substantially in a horizontal plane passing through the crankshaft 24. A substantially horizontal finger 40 is provided at the lower end of the vertical portion 39, i. e., substantially in the horizontal plane of the crankshaft. A rigid connector 42 is pivotally mounted upon the finger 40 and the crank arm 28 of the crankshaft. Referring to Figure 5, the connector 42 is formed of stiff wire and is of such length that the actuator and crank arm are connected such that the vertically extending portion 39 of the actuator 35 is substantially vertical when the crank arm is in the vertically upward position as shown in Figure 5. Thus, as the crankshaft rotates, the actuator arm 39 is forced to describe an arc in pendulum fashion.

As shown in Figures 1, 4 and 5, an offset portion 41 of the actuator member 35 extends outward beyond the edge of the base and thence upward to provide a finger 43 positioned above the air passage valve member 30. As the crankshaft rotates the vertically extending portion 39 is swung through an arc, causing the horizontal portion 38 to be rotated about its longitudinal axis. The horizontal finger 43 thus describes an equal arc and is caused to move downward and upward depending upon the position of the crankshaft. As the finger 43 moves downward the air passage valve member 30 is forced downward against the resilient force of the band 33 as described in detail hereinafter.

A similar second actuator member 37 is positioned proximate the opposite edge 45 of the base and extends, in a manner as previously described in connection with the first actuator 35, from the crank arm to a position proximate the second air passage valve 32 such that movement of the finger 47 causes the second air passage control valve to be opened and closed depending on the position of the crankshaft which is connected to the second actuator 37 by a connector 48.

A connecting rod 29 is pivotally affixed at the lower end thereof to the horizontal portion of the crank arm 28 and at the upper end thereof to the lower surface of the tube 20.

The connecting rod 29 is affixed to the tube 20 by forming a substantially horizontal section at the upper end of the connecting rod 29. The horizontal section is then affixed by means of a connecting member 26 which may be, for example, a strip of adhesive material which will adhere to the under surface of the tube 20 to retain the connecting rod in position.

Referring to Figures 1 and 2, a driving wheel 50 is affixed to the crankshaft beyond the base, while idler wheels 52 are appropriately mounted to allow the desired movement of the toy. For example; in this embodiment the idler wheels are mounted on a common radius, while the power wheel is mounted upon the radius of a circle concentric with that of the idlers 52. Therefore, as the driving wheel 50 rotates, the toy will move in a large circle. Erratic or straight line motion may be provided by one skilled in the art.

Thus, in operation, the balloon 10 is inflated by mouth by means of the mouthpiece 12 and air inlet valve 11 (Figure 3) to assume the inflated character as shown in Figure 1. Operation of the toy may be prevented until ready by holding the driving wheel 50 to prevent rotation. When the toy is placed on a flat surface and the drive wheel 50 is released, it will be rotated in which ever direction it is initially started. That is, referring to Figures 4 and 5 with the crank arm 28 in the vertically upward position as shown in Figure 5, if rotation is begun in a clockwise direction the vertically extending arm 39 of the actuator 35 is swung inward while the crank arm 28 moves through 180°, causing the horizontal finger 43 to move downward from the position shown in Figure 4 to the position shown dotted in Figure 4. The air passabe control valve 30 is therefore caused to move from the closed position at which it compresses the inflatable tube 20 to the open position at which air is admitted from the balloon 10 to the tube 20. Simultaneously, during movement of the crank arm from the vertically upward to the vertically downward position, the second actuator 37 extending from the crank arm 28 to the second air passage control valve 32, referring to Figures 5 and 6 is swung outward causing the finger 47 above the second valve member 32 to be raised out of contact with the valve 32. Thus, the outlet valve 32 remains closed by the force of the resilient band 33. Thus, through the 180° of clockwise rotation air is emitted from the balloon 10 to the tube 20 through the inlet valve 30 and prevented from escaping by the exhaust valve 32. If the tube 20 is inflated it seeks to assume a circular cross section and drives the connecting rod 29 downward and the crank arm 28 from the vertically upward to the vertically downward position throughout the period of rotation of the crankshaft, from the vertically downward to the vertically upward position, i. e., from the position of 180° clockwise to 360°, the valve action is reversed, thereby causing the finger 43 to be raised above the air passage valve member 30 to allow closure of the valve through the upward force of the resilient band 33. Simultaneously, the finger 47 is swung downward as the vertically extending member of the actuator 37 is swung inward in Figure 5. The air passage control valve 32 is thus opened and the air contained within the tube 20 is exhausted through the exhaust opening 23, allowing the tube to be deflated and to assume its deflated rectangular cross section. While the air is being exhausted from the tube, the resiliency of the tube to which the connecting rod is affixed exerts an upward force upon the connecting rod. The degree of resiliency required to urge the connecting rod 29 upward can be determined by proper selection of the resilient material of which the tube 20 is formed or by maintaining a tension upon the tube as discussed hereinbefore.

It may be said, therefore, that in operation, the inflatable tube and the interdependent valving arrangement, causes rotation of the crankshaft in whichever direction rotation is commenced. The kinetic energy of the moving parts causes movement of the crank arm through the upper and lower dead center positions to allow smoother rotation of the crankshaft with a power stroke furnished by the inflation of the tube during 180° of rotation of the crankshaft followed by a upward stroke furnished by the resiliency of the rubber tube as air is exhausted from the tube.

While the invention has been described as if air were the propelling force, it will be appreciated that any other gas would be equally applicable.

There has thus been described a new and novel gas operated self-propelled vehicular toy.

What is claimed as new is:

1. A self-propelled toy comprising: a vehicular base; an inflatable gas reservoir mounted upon the upper surface of said base and having a gas outlet extending through said base to the lower surface thereof; a flexible tube extending longitudinally along said lower surface of said base, said tube having a gas inlet connected with the gas outlet of said reservoir and a gas outlet proximate an outer end of said base, said tube having a substantially flat rectangular cross-sectional configuration in the relaxed condition, said tube being expandable to a substantially circular cross-sectional configuration in response to gas pressure within said tube; a connecting rod affixed at one end thereof to said tube; a crankshaft rotatably suspended from said base below said tube, said connecting rod being pivotally connected to a crank arm of said crankshaft to impart rotary

motion to said crankshaft in response to reciprocation of said connecting rod; valve means connected to said crankshaft to pulse gas from said reservoir through said tube whereby said connecting rod is caused to reciprocate; and a drive wheel connected to said crankshaft.

2. A self-propelled toy comprising: a vehicular base; an inflatable gas reservoir mounted upon the upper surface of said base and having a gas outlet extending through said base to the lower surface thereof; a flexible tube extending longitudinally along said lower surface of said base, said tube having a gas inlet connected with the gas outlet of said reservoir and a gas outlet proximate an outer end of said base, said tube having a substantially flat rectangular cross-sectional configuration in the relaxed condition, said tube being expandable to a substantially circular cross-sectional configuration in response to gas pressure within said tube; a connecting rod affixed at one end thereof to said tube; a crankshaft rotatably suspended from said base below said tube, said connecting rod being pivotally connected to a crank arm of said crankshaft to impart rotary motion to said crankshaft in response to

reciprocation of said connecting rod; a first valve connected to said tube intermediate said tube inlet and said connecting rod, a second valve connected to said tube between said connecting rod and said tube outlet, means interconnecting said crankshaft and said first and second valves to alternately open and close said valves whereby gas is pulsed through said tube to cause said connecting rod to reciprocate as said tube alternates between said rectangular and said circular configuration; a drive wheel connected to said crankshaft; and an idler wheel connected to said base.

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