Jan. 18, 1966 H. K. BROSS 3,229,410

RACK-ACTUATED AIR CUSHIONED TOY VEHICLE

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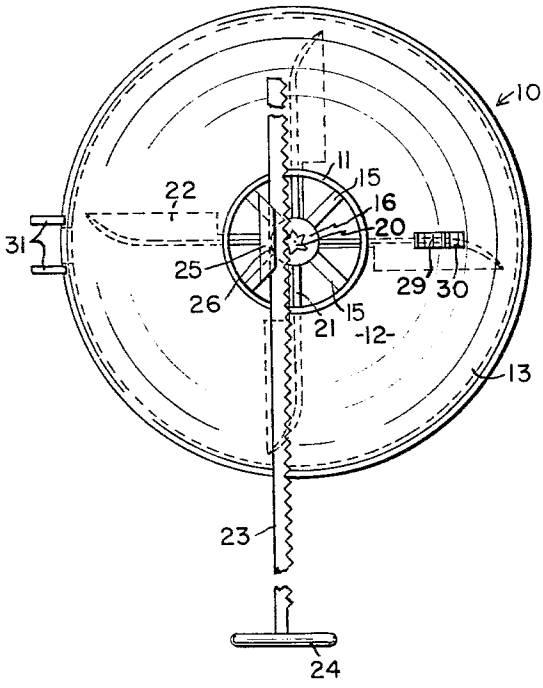


FIG. 1

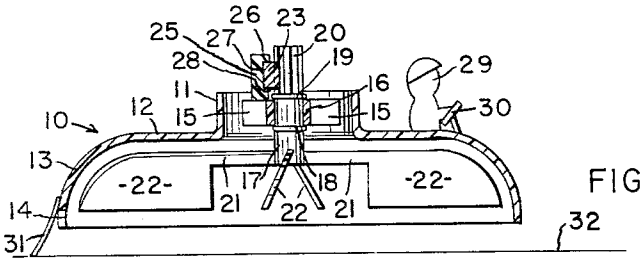


FIG. 2

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RACK-ACTUATED AIR CUSHIONED TOY VEHICLE

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4 Claims. (Cl. 46—1)

This invention relates to toys. Particularly, it relates to air-cushioned toy vehicles which move over a surface on a cushion of air generated by a rotating fan carried by said toy.

In my prior U.S. applications, Serial Numbers 257,432 filed February 11, 1963, and 276,754, filed April 30, 1963, I disclosed various toys operated by a child pulling a flexible plastic rack which drove a pinion gear carried by a rotatable drive means, e.g. a wheel or propeller, of the toy. The present invention provides a further extension of the invention of said applications whereby a rack can be used to rotate the fan of a toy designed to move on a cushion of air. The toys of the invention are entertaining, relatively simple, easily operated by a small child, they can be inexpensively and ruggedly formed, e.g. by injection molding, and can be easily assembled, e.g. by snapping the parts together.

The invention will be understood by reference to the drawings and following description which includes a preferred embodiment of the invention.

FIGURE 1 is a top view of the toy of the invention wherein the vehicle is in engagement with a pulling rack.

FIGURE 2 is a side view, partly in section, of the toy.

The toy has the annular housing or body unit indicated generally at **10** which can be a one-piece integral plastic molding including: the upper tubular air inlet section **11**, the flat disk portion **12**, the annular downwardly extending arcuate skirt portion **13**, four spokes **15** extending inwardly from section **11**, and terminating in the sleeve **16**. The fan unit, which can also be a one-piece integral plastic molding, includes: the cylindrical shaft **17** journaled in sleeve **16** and prevented from moving axially by its integral annular flanges **18** and **19**; while the upper portion of shaft **17** defines pinion gear teeth **20**, and the lower portion of shaft **17** carries the radially extending arms **21** terminating the fan blades **22**.

In operation, and as shown in the drawings, a plastic flexible toothed rack **23**, having handle **24**, can be inserted between the rack guide **25** molded integrally with two of the spokes **15**, and pinion gear **20**. The sides **26**, **27**, and **28** of guide **25** serve to support said rack 23 and guide it into meshing toothed engagement with the teeth of pinion gear **20**. The shell or body **10** is then held by the child, e.g. at portion **11**, and the pulling means, e.g. rack **23**, is rapidly pulled away from body **10** by means of its handle **24**. This rapid pulling will spin the fan which will draw air into tubular section **11** above said fan and discharge the air outwardly around the periphery of the bottom edge of the annular skirt portion **13** below said fan. Once the rack is pulled completely out of engagement with the vehicle, the vehicle can now be placed above a surface **32** and released by the child whereupon it will float above surface **32** upon a cushion of air. Due to the slot **14** in the rear lower edge of skirt **13**, a jet of air will escape through said slot so as to propel the vehicle forwardly on its air cushion. The simulated figure of a man **29** steering the vehicle by means of simulated steering wheel **30** adds additional weight to the forward portion of the vehicle, causing the vehicle's front end to tilt downwardly. This tilting will also tend to drive the vehicle in a forwardly

direction since the propeller unit will be correspondingly tilted. In order to improve the stability of the vehicle and minimize rotation of the vehicle about its vertical axis due to friction between shaft **17** and sleeve **16**, two small strips **31**, which can be of string, of flexible plastic, rubber, or cloth, or like material, or which can rigid, can be glued, or otherwise fixed onto the rear of skirt **13** so as to act as drags on the surface **32**. Also, the flat FIGURE 29 will act as a stabilizing fin or vane to offer wind resistance to rotation of the vehicle around its vertical axis and further help to stabilize the vehicle against said rotation.

When the momentum stored in freely rotating fan unit is lost, the vehicle will then, of course, lose its air cushion and sink to the surface **32**, where it can be retrieved by the child and again actuated.

The toy, in its simplest form and omitting strips **31**, can be made of plastic, such as polyethylene, by injection molding in three parts, namely the rack, the body unit and the fan unit. The fan unit comprising integrally molded elements **17** to **22** inclusive, can be assembled to the body unit by forcing pinion gear **20** and flange **19** upwardly through the sleeve **16** until the flanges **18** and **19** straddle sleeve **16** as shown in FIGURE 2. Since sleeve **16** is made of a slightly resilient plastic, e.g. polyethylene, it will stretch enough to allow passage of flange **19** through the bore of said sleeve **16**, which sleeve will then resume its original shape to retain the fan unit as shown.

While the toy unit is shown including the rack **23**, the vehicle can also be operated by winding a string (not shown) around the pinion gear **20** and then rapidly pulling the string off said gear **20** to thereby spin shaft **17** and actuate the vehicle. However, the use of rack **23** is much preferred to an actuating string since said rack is easily threaded into meshing engagement with gear **20** and the rack permits a harder stroke and can be more easily operated by a child. On the other hand, strings become tangled, they easily break, and are slow and difficult to wind. Also, the rack **23** is preferably made of a slightly resilient plastic such as polyethylene. If a rigid or metal rack is used, it will require pulling the rack outwardly in a substantially straight line to avoid bending or breaking the rack, or prying the rack guide **25** away from pinion gear **20** thereby damaging the toy. For this reason, metal racks are not preferred.

The rack and the meshing pinion gear can take various forms other than that specifically illustrated, for example forms such as those illustrated in: FIGURES 26 to 31 of my copending U.S. patent application, Serial No. 276,754 filed April 30, 1963, which figures and accompanying description are hereby incorporated by reference.

In order to save weight and improve performance, the body unit **10** can be formed by a combination of injection and blow molding, whereby the shell portions **12** and **13** are formed by blow molding so as to result in a very light weight wall portion, while the remaining portion of body **10** are injection molded of thicker sections.

I claim:

1. An air-cushioned toy vehicle comprising a rotatable fan mounted on a shaft, a housing journaling said shaft for rotatable movement and including an air inlet above said fan and an annular skirt surrounding said fan and extending below said fan whereby air is drawn through said inlet into said housing and then discharged from around the periphery of the lower edge of said skirt, pinion teeth defined by said shaft, a flexible plastic rack having a series of teeth on at least one side of said rack, and guide means defined by walls of said housing proximate said pinion teeth for guiding said rack into meshing

toothed engagement with said pinion teeth upon insertion of said rack between said guide means and said pinion teeth, said rack then being pullable out of said engagement to spin said shaft and said fan.

2. A toy vehicle according to claim 1, wherein said housing is formed with weight means on its forward portion which tends to tilt said forward portion downwardly to thereby tilt the horizontal axis of said fan whereby said fan propels said vehicle forwardly.

3. A toy vehicle according to claim 2 wherein said weight means is substantially flat and offers wind resistance to said toy rotating about its vertical axis.

4. A toy according to claim 3, wherein a member fixed to the rear of said housing acts as a drag upon the surface above which the vehicle is moving to stabilize said vehicle against rotation about its vertical axis.

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