Oct. 12, 1971 J. H. LEMELSON 3,611,622

TRACK TOY

Filed Feb. 16, 1970

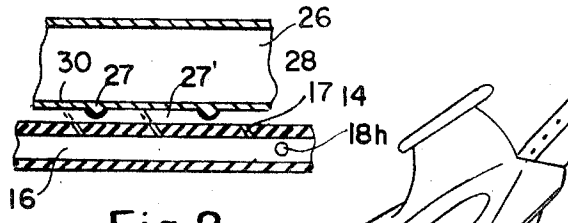


Fig.2

Fig.1

Fig.4

Fig.5

Fig.6

Fig.7

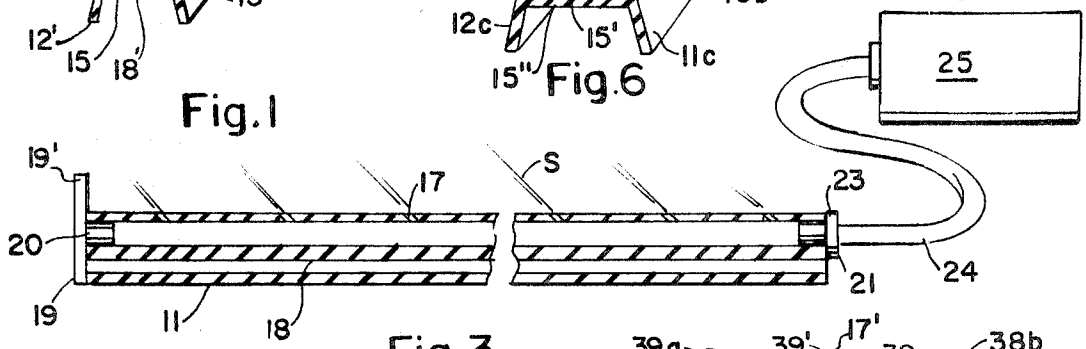


Fig.3

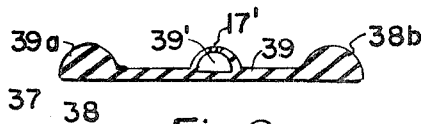


Fig.8

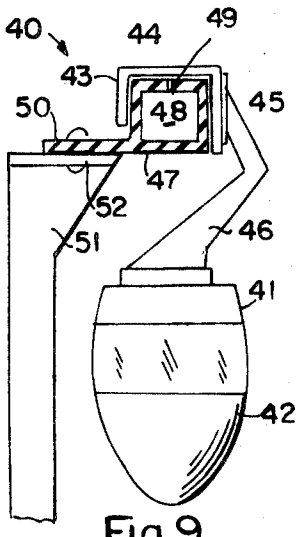


Fig.9

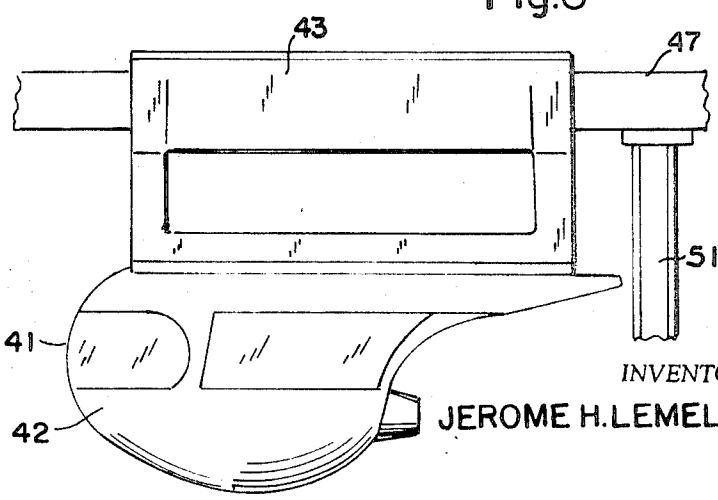


Fig.10

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TRACK TOY

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ABSTRACT OF THE DISCLOSURE

A toy vehicle and trackway therefore are provided in which compressed air is utilized as a medium for propulsion of the toy along the trackway. In one form, the trackway is an elongated extrusion, such as a rectangular, hollow tube, containing holes drilled through a wall thereof substantially along the length of the tube and directed so as to permit air pumped into the tube to be ejected as a plurality of jet streams upwardly and in the direction of movement of the vehicle. The vehicle is a lightweight shell having one or more portions conforming to the configuration of the track or trackway and adapted to normally rest with one or more undersurfaces of the vehicle abutting or disposed immediately off the surface of the track. Air pumped into the track is directed through the holes in the wall thereof upwardly against the conforming surface of the vehicle and is operative to both lift the vehicle and cause it to travel along the track. The track may be made of flexible or rigid material. If flexible, it may contain a bendable metal wire so that it may be bent and retained in a particular curved configuration.

In another form, the track is in the shape of a hollow monorail supported at spaced intervals above a surface by means of poles and the vehicle is suspended from a carriage which is driven along the monorail by air ejected upwardly through holes in the upper wall of the monorail.

SUMMARY OF THE INVENTION

This invention relates to a track toy including a vehicle and a track way for guiding said vehicle in travel along said trackway. In particular, the trackway or vehicle guide of the instant invention is an elongated hollow duct provided with a plurality of holes through the upper wall thereof for ejecting jets of air from the passageway extending through the track when properly pressurized. The jets of air are operative to "float" the vehicle above the track and propel it longitudinally along the track.

It is a primary object of this invention to provide a new and improved trackway toy for propelling and guiding a vehicle along a fixed path.

Another object is to provide a track toy and propulsion means for a vehicle traveling an elongated track thereof which propulsion means is not directly associated with the vehicle itself.

Another object is to provide a track toy including a track containing means for ejecting air upwardly and in the direction of travel of the vehicle along said track in such a manner as to both lift the vehicle and cause it to be propelled longitudinally along the track.

Another object is to provide an improved jet propulsion track toy in which a guide or track for a vehicle is selectively adjustable as to shape.

Another object is to provide a new and improved monorail propulsion system applicable to toys as well as full-scale vehicles.

With the above and such other objects in view as may hereinafter more fully appear, the invention consists of the novel constructions, combinations and arrangements of parts which will be hereinafter more fully described and illustrated in the accompanying drawings wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

FIG. 1 is an isometric view of a toy track and vehicle riding thereon constructed in accordance with the teachings of the instant invention;

FIG. 2 is a side view in cross section of a fragment of a toy vehicle and track guide means therefor;

FIG. 3 is a side view with parts broken away for clarity of the track shown in FIGS. 1 and 2 and includes an air-pressurizing means operatively coupled to one end of the track;

FIG. 4 is an end cross-sectional view of a modified form of the track of FIGS. 1 to 3;

FIG. 5 is an end cross-sectional view of a modified form of the track of the instant invention and a modified vehicle operative to ride therealong;

FIG. 6 is an isometric view in cross section of a fragment of a toy trackway which is a modified form of that illustrated in FIG. 1 and contains means for driving a toy vehicle longitudinally therealong in either direction;

FIG. 7 is an end view of another form of trackway having upwardly extending guides for a toy vehicle;

FIG. 8 is an end view of yet another form of trackway containing features of the instant invention;

FIG. 9 is an end view of a monorail trackway and vehicle riding therealong; and

FIG. 10 is a side view of the vehicle and track of FIG. 9.

There is shown in FIG. 1 a toy arrangement **10** comprising an elongated track or guide way **11** having sloping side walls **12** and **13** the lower peripheral edges **12'** and **13'** of which are adapted to rest on a surface such as the top of a table or floor thereby presenting the upper wall **14** of the trackway substantially parallel to the supporting surface. Thus, if the supporting surface is horizontal, the upper wall **14** will also be substantially horizontal. The central portion **15** of the track **11** contains a passageway **16** extending completely through the track from one end to the other and, in the particular embodiment of FIG. 1, a soft metal wire **18** between 1/16 and 1/8 inch in diameter, which is utilized to permit the track **11** to be bent and to retain the bent configuration such as to permit the track to be deformed and conform to curves and other shapes. The wire **18** may be made of soft aluminum, copper or lead.

Extending upwardly through the upper wall **14** of the track **11** are a plurality of holes **17** which communicate the passageway **16** with the volume immediately above the upper wall **14**. The holes are angulated in the direction of movement of the vehicle along the track so that air pumped into the passageway **16** will be directed as a plurality of streams or jets which may react on the vehicle to lift it a short distance above the track so that the vehicle disengages all surfaces and react upon said vehicle in a manner to propel it, as it is lifted along the track.

Details of the construction of the vehicle **26** are shown in FIGS. 1, 2, 4 and 5 which illustrate different embodiments of the vehicle. In FIG. 1, the vehicle **26** is composed of a hollow, lightweight body **26'** having a channel-like formation **28** extending downwardly from and along the length of the vehicle. The channel-like formation **28** has sloping side walls **29***a* and **29***b* and a top wall **30** which substantially conform to the upper portion of the side walls **12** and **13** and the top wall **14** of the trackway **11**. When air, under sufficient pressure, is pumped through the passageway **16** and ejects as a plurality of narrow jet streams through the holes **17** in the track, it is operative to lift the vehicle **26** a brief distance above the track, perhaps several thousandths of an inch to 1/32 of an inch,

so as to clear all surfaces of the vehicle from either the surfaces of the track or the surface upon which the track rests, depending on the relative configurations of the vehicle and the track.

In FIG. 2, the wall **30** of the channel-like formation **28** of the vehicle **26** contains a plurality of rib-like formations **27** at spaced-apart intervals along the wall **30** which formations serve to provide separate chambers **27'** between the upper wall **14** and wall **30** so as to substantially confine air ejected through the holes **17** between the vehicle and the track and thereby increase the jet propulsion efficiency. The ribs **27** are spaced apart such that at least one hole **17** is disposed between each two ribs at any time during the travel of the vehicle along the track except when one or more of said holes are in direct alignment of the rib **27**.

Notation **18***h* of FIG. 2 refers to a hole disposed in the side or bottom wall of the passageway **16** into which hole an inlet tube may be inserted or secured by means of a coupling to provide compressed air to the passageway **16** for propelling the vehicle therealong.

In FIG. 3, one end of the track **11** is shown stopped off with a plug **20** forming part of an end plate **19** frictionally secured therein. A projecting portion **19'** of the end plate **19** protrudes upwardly from the track and may serve to stop a vehicle riding therealong. The other end of the track **11** is provided with a coupling **21** having a plug portion **22** frictionally engaged in the end hole of the track and a head portion **23** to which is secured a flexible plastic tube **24** which extends from a pump or fan **25** for pumping air under pressure through the track passageway **16** to eject the streams S of air upwardly and in the direction of movement of the vehicle along the trackway.

As stated, the pump inlet line **24** may be operatively connected to the track **11** through an opening in the side wall or bottom wall thereof and the track **11** may extend in an endless loop to permit the vehicle or vehicles to be continuously driven around the loop.

In FIG. 4, the track or guideway **11***a* is illustrated as being of substantially rectangular configuration with a flat bottom wall and flat-parallel side walls. Notation **16** refers to the passageway extending through the upper portion of the rectangular track **11***a* and **17** to said plurality of holes extending upwardly and angled in the direction of travel of the vehicle. The vehicle **31** is shown as composed of a lightweight upper structure and parallel side walls or guide ways **32** and **33** for guiding the vehicle along the track and preventing it from jumping or disengaging said track.

In FIG. 5, the track **11***b* is shown as having a substantially triangular cross-section having an upper chamber **16'** extending longitudinally along the track and a s ft, flat bendable wire **17'** disposed within the extrusion beneath the passageway **16'**.

A plurality of small holes **17** are drilled or otherwise provided in the apex portion **11***c* of the track to lift the vehicle and direct it longitudinally along the track.

In FIG. 6 is shown a modified form of toy track denoted **11***c* having inwardly sloping side walls **12***c* and **13***c* connected to a top wall **14***c* and defining two parallel passageways **16***a* and **16***b* formed of the upper portions of the side walls, a central partition wall portion **15'** and a lateral wall portion **15"** extending between the side walls **12***c* and **13***c*. The trackway **11***c* may be formed by extruding rigid or flexible plastic or metal such as aluminum to contain the passageways **16***a* and **16***b* and may also include a bendable wire member extruded in situ in an extension of the lateral partition portion **15"**.

Drilled or punched in the upper wall **14***c* are a plurality of first holes **17***a* extending upwardly and sloped in one direction along the length of the track **11***c*. The holes **17***a* serve as small passageways for ejecting air from the longitudinal passageway **16***a* in one direction along the track **11***c* for propelling a vehicle therealong in said one direction as described. A plurality of second holes **17***b* extend between the passageway **16***b* and the volume above the upper surface of the top wall **14***a* of the trackway and slope in the direction opposite to that in which the holes **17***a* slope.

By connecting respective outputs of a two-way valve to respective of the passageways **16***a* and **16***b* with the input of the valve extending to a pump or fan, and suitably selectively controlling the valve to cause air to pass therethrough into either of the passageways, a vehicle may be propelled selectively in either direction along the trackway **11***c*, depending on which of the passageways, **16***a* or **16***b*, receive air under pressure.

In FIG. 7 is shown another form of trackway **11***d* in cross section having a longitudinal passageway **16'** extending therealong and having a flat bottom wall **14'** which, when disposed on a surface such as a table top or the floor, disposes the side walls of the trackway in the vertical attitude illustrated with extensions **12***d* and **13***d* thereof extending above the upper wall **14"** in which small holes are drilled or punched at spaced intervals along the extrusion as described. Thus, if a vehicle is disposed within the channel-like formation defined by the extensions **12***d* and **13***d* of the side walls and the upper wall **14"**, it may be propelled longitudinally along said trackway as described with the extensions **12***d* and **13***d* serving to guide same. A complete vehicle or a downwardly extending portion of a vehicle may be inserted into a channel-like volume defined by wall portions **12***d*, **13***d* and **14"**.

In FIG. 8, a track **37** is shown having a substantially, flat, sheet-like central portion **38** and edge portions **38***a* and **38***b* integrally formed therewith. A central conduit portion **39** contains a passageway **39'** longitudinally therethrough and a plurality of small holes **17'** extending in the upper wall of the passageway portion **39** for directing air upwardly against a shaped bottom portion of the vehicle and in the direction of travel of the vehicle for the purpose described.

The track configurations described are preferably made by extruding a plastic material, preferably, although not necessarily a flexible plastic in a manner to have said elongated passageway permanently deformed therein and, in certain instances, said flexible, bendable metal wire extending the length of the track. A toy vehicle guided by the side guides **38***a* and **38***b* may be virtually lifted and may travel the length of the track when sufficient air is passed through the passageway of the central formation **39'**.

In FIGS. 9 and 10 is shown a monorail system **40** for supporting, guiding and propelling a suspended vehicle from the monorail. The monorail **47** is shown as having a substantially rectangular cross-section defining a passageway **48** extending completely through the monorail. A plurality of holes **49** are formed in the upper wall of the track **47** and are directed in the direction of travel of the vehicle. A flange portion **50** of the hollow track **47** may be utilized to fasten said track to the head **52** of an upright pillar or pole **51** which is one of a plurality of such pillars extending along the length of the track for supporting said track in a desired configuration.

Suspended above the monorail portion **47** is a carriage **43** for supporting a monorail vehicle **41** from above. One or more arm members **46** extend outwardly and downwardly from the carriage **43** and support the vehicle **41** therebeneath. Air introduced under sufficient pressure into the passageway **48** of the track **47** is directed upwardly through a plurality of small holes **49**, holes in the upper wall of the monorail track and is utilized to float the carriage **43** above said monorail and directs it longitudinally along the monorail as described.

It is noted that the means described and illustrated in accompanying drawings or modifications thereto may be applied to the conveyance of other objects, articles or material by air along defined guideways. Where the length

of the track or guideway may result in the loss of a substantial amount of air which would not be sufficient to support and drive a vehicle along the entire length thereof, a plurality of air compressors or turbines may be disposed in the system at spaced intervals along the trackway or connected to respective spaced interval portions of the trackway to provide upwardly directed jets of air of sufficient velocity and flow along the entire trackway to support and propell one or more vehicles simultaneously therealong. All such compressors may be operated continuously or in response to controls sensing the presence of a vehicle at or in advance of that section of trackway operative to receive air under pressure from the next compressor to be operated.

In another embodiment, the openings **17**, **49**, etc. in the top wall of the trackway may each contain a valve such as a spring closed ball valve or other form of simple valve having a slow-to-close after opening means for directing air upwardly and in the direction of travel of the vehicle when the vehicle is above the valve. Such valves may be opened by engagement therewith or the ball portion of the valve by a downwardly projecting portion of the vehicle such as an arm or wheel engaging and opening or holding open said valve as the vehicle passes thereover. A plurality of such valves along the length of the vehicle may be so closed as the vehicle passes to allow air to escape and propel the vehicle as described.

In the latter described embodiment, each such ball valve or other form of coil spring closed valve may be retained closed to permit air to flow upwardly and forwardly as a stream or streams by fluidic controlled means or a rail-like means projecting downwardly from the vehicle along the length thereof it is desired to keep the valve closed by contact therewith to permit the upward flow of air for the time the vehicle is over the valve.

In yet another form of the invention, the vehicle may contain one or more electric motor driven fans or turbines generating a sufficient flow of air which is directed downwardly to lift the vehicle and propell it as described, in either the forward or rearward direction depending on direction of flow of air from the vehicle. Two or more conducting metal strips may be provided in the track or bed **11**, **11***a*, **11***b*, **11***c*, **11***d* etc. and protruding outwardly therefrom for conducting electrical energy to power the fan or turbine motor in the vehicle. Spring loaded brush or roller contacting devices may extend from the vehicle to engage said strips as the vehicle is propelled over said track. Reference is made to U.S. Pat. 3,500,581 issued Mar. 17, 1970 for Vehicle Trackway Toy of which the instant invention is a continuation-in-part for further details of track construction have such mentioned metal strip conductors provided therein. The thin metal strips, for example, may extend into and upwardly from the solid upper portion of track **11***a* adjacent the passageway **16** or adjacent the passaeway of track **11** of FIG. 1. Pair of electrically conducting strips may also be extruded with the wall portions of the other track embodiments illustrated.

I claim:

1. A vehicle propulsion system comprising in combination:

a trackway including an elongated tubular portion extending the length of said trackway, said tubular portion being narrower in width than the vehicle and shaped for guiding said vehicle in a path longitudinally along said trackway,

a first passageway extending longitudinally along substantially the entire length of said tubular portion,

air-pressurizing means connected to said passageway for flowing air into said passageway,

a plurality of branch passageways extending through the wall of said tubular portion at spaced intervals along the length thereof,

means for supporting said trackway with said branch passageways facing upwardly,

each of said branch passageways being inclined in the direction of travel of said vehicle along said trackway,

said vehicle having a shaped portion adapted to straddle and be guided along said tubular portion of said trackway during its travel,

means for power operating said air-pressurizing means in the manner to force air into said passageway under sufficient pressure to cause said air to flow through said passageway and to be ejected from all of said branch passageways along said tubular portion of said trackway as a plurality of fluid streams in a manner to react on and float said vehicle above said trackway and to exert sufficient force on the vehicle in one direction along said trackway to cause said vehicle to travel in said direction along said trackway

2. A system in accordance with claim **1**, there being a second passageway in said trackway extending parallel to said first passageway, a plurality of branch passageways in said second passageway inclined upwardly and in a direction opposite to that of the branch passageways in said first passageway and means for flowing air under pressure into said second passageway.

3. A system in accordance with claim **1**, including a two-way valve having an input from said air-pressurizing means and respective outputs to said first and second passageways, said valve being operative to gate air under pressure to one of said passageways at a time, said branch passageways in said second passageway being operative to direct respective streams of air for propelling a vehicle along said trackway in the direction opposite to that it is propelled by air ejected from said first branch passageways, and means for operating said valve to selectively gate air to one of said passageways.

4. A system in accordance with claim **1**, said trackway comprising an elongated tubular extrusion made of flexible plastic and containing said passageway for pressurized air, and a second passageway extending longitudinally through said extrusion parallel to said first passageway, said second passageway containing a bendable metal wire capable of retaining its shape as bent and permitting said trackway to be hand bent to different desired configurations.

5. A system in accordance with claim **4**, in which said elongated extrusion has a bottom surface adapted to lie flat on a horizontal surface for retaining said trackway in an upright attitude with said branch passageways facing upwardly.

6. A system in accordance with claim **1**, in which said trackway has generally sloped side walls and a flat upper wall and said vehicle has side walls operative to travel above said sloped side walls, a bottom wall of said vehicle extending substantially parallel to and above said flat upper wall of said trackway, said bottom and side walls of said vehicle being configured to define sheet-like volumes between said sloped side walls and upper wall of said trackway between which air from said branch passageways may flow in a manner to support said vehicle on a film of air above said trackway, the spacing of said branch passageways along said trackway being such that at least one branch passageway is always supplying air to said volumes between said vehicle bottom and side walls and the trackway to always maintain said vehicle in a floating attitude above said trackway.

7. A system in accordance with claim **6**, in which said bottom wall of said vehicle contains a plurality of downwardly facing rib-like protrusions extending laterally across said bottom wall to provide reaction surfaces for air directed from said branch passageways.

8. A system in accordance with claim **1**, including means for supporting said trackway above a surface, a carriage movable above and along said trackway, means for suspending said vehicle from said carriage below said trackway.

9. A vehicle propulsion system in accordance with claim 1, whereby said trackway has a flat central portion and guides for the wheels of a wheeled vehicle protruding upwardly from said flat portion.

10 A vehicle propulsion system comprising in combination with a vehicle:

a trackway made of flexible plastic and having an elongated tubular portion extending the length of said trackway, said trackway being shaped for guiding said vehicle in a path longitudinally therealong,

a first passageway extending longitudinally along substantially the entire length of said tubular portion, air-pressurizing means connected to said first passageway and operable for flowing air into said passageway,

a plurality of branch passageways extending through the wall of said tubular portion at spaced intervals along the length thereof,

means for supporting said trackway with said branch passageways facing upwardly,

each of said branch passageways being inclined in the direction of travel of said vehicle along said trackway,

a second passageway extending longitudinally through

said trackway and parallel to said first passageway, said second passageway containing a bendable metal wire capable of retaining its shape as bent and permitting said trackway to be hand bent to different desired configurations, and

means for power operating said air-pressurizing means in a manner to force air into said passageway under sufficient pressure to cause said air to flow through said passageway and to be ejected from all of said branch passageways along said tubular portion as a plurality of fluid streams for reacting and floating said vehicle above said trackway and for exerting sufficient force on the vehicle in one direction to cause said vehicle to travel in said direction along said trackway.

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