United States Patent

Pressman

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[54] DYNAMIC MOBIUS BAND

[72] Inventor: **Jerome Pressman,** 4 Fessenden Way, Lexington, Mass. 02173

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[52] **U.S. Cl.**.....**46/243 P,** 46/216

[51] **Int. Cl.**.....**A63h 19/10,** A63h 33/26

[58] **Field of Search**.....46/216, 243 M

[56] **References Cited**

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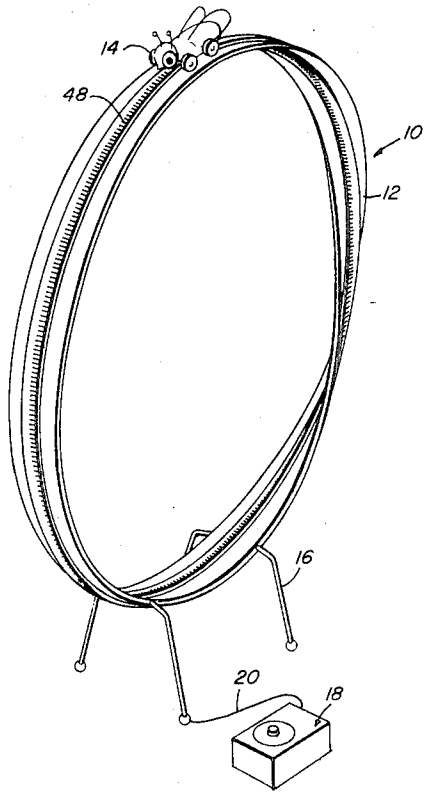
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Primary Examiner—Russell R. Kinsey
Assistant Examiner—Robert F. Cutting
Attorney—Morse, Altman & Oates

[57] **ABSTRACT**

A dynamic model of a Mobius band is provided. A track defining a Mobius band is provided with a self-propelled vehicle which moves about the track to demonstrate the one-sided topological characteristics of the surface.

8 Claims, 3 Drawing Figures



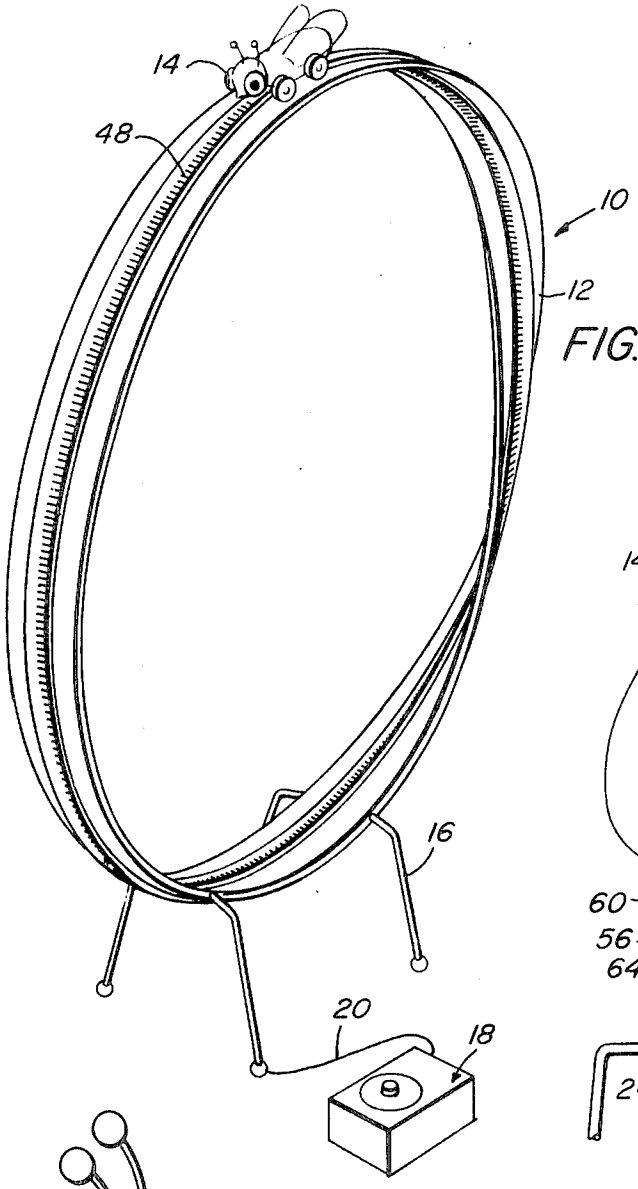


FIG. 1

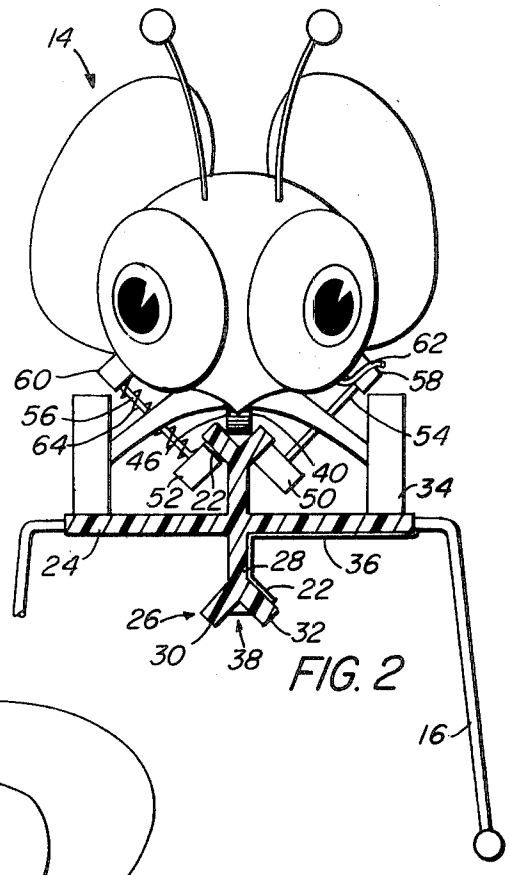
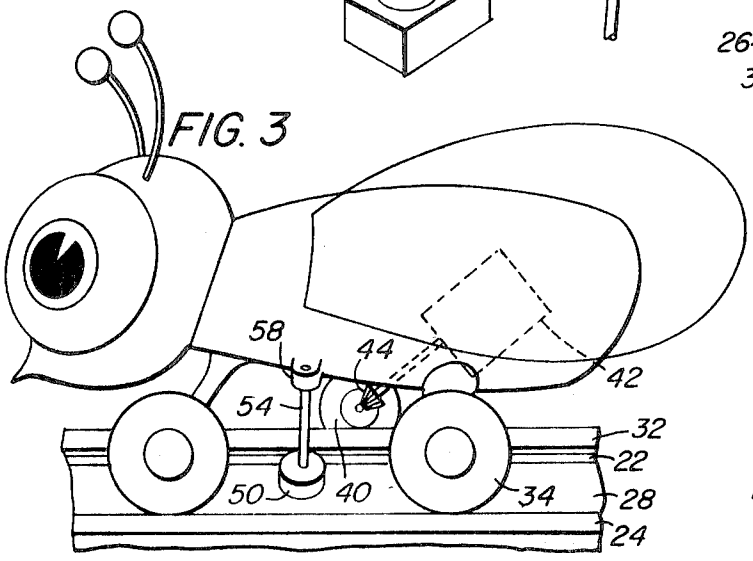


FIG. 2

FIG. 3



INVENTOR
JEROME PRESSMAN
BY Morse, Altman & Oates
ATTORNEYS

DYNAMIC MOBIUS BAND

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to an educational device and more particularly is directed towards a device for dynamically demonstrating the characteristics of a Mobius band.

2. Summary of the Prior Art

If a long rectangular ribbon be given half a turn and the two ends joined together the resulting surface is called a Mobius band, a one-sided topological surface. The Mobius strip or band, because of its single surface characteristics has been an object of study by mathematicians and students and its fundamental nature is now even taught in elementary schools. There are various forms of Mobius bands obtained by cutting a cylindrical strip, giving one end a certain number of half twists, 180° turns, and then reuniting the ends. In particular, the single half-twist provides a one-sided surface. Because of its unusual configuration, it is sometimes difficult for a student to comprehend the unity of the topological surface and it is an object of the present invention to provide a dynamic model of a Mobius band whereby the topological characteristics may be readily demonstrated.

A further object of this invention is to provide a dynamic model of a Mobius band wherein a self-propelled vehicle is movably mounted to a track in the form of a Mobius band whereby the topological characteristics of the band are demonstrated by the vehicle moving on the track.

SUMMARY OF THE INVENTION

This invention features a dynamic model of a Mobius band comprising a track in the form of a Mobius band and a self-propelled vehicle mounted to the track for movement thereon. The vehicle may be spring or battery operated or the vehicle may contain a motor energized by an electrified track.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a view in perspective of a dynamic model of a Mobius ban made according to the invention,

FIG. **2** is a cross-sectional view of the track with the vehicle mounted thereon, and,

FIG. **3** is a view in side elevation of the self-propelled vehicle movable on the track.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings the reference character **10** generally indicates a dynamic model of a Mobius band comprised of a track **12** and a self-propelled vehicle **14** mounted for movement therealong. The track **12** is configured as a Mobius band and, in the preferred embodiment, is fabricated from a relatively rigid material such as plastic, metal or the like supported in an upright position by spaced legs **16**. Optionally, the track could be suspended on a line in the manner of a mobile.

Where the vehicle **14** is powered by means of an external electrical power source, as shown in FIG. **1**, a nonconductive plastic track is preferred since it simplifies the insulating requirements for the electrical circuit about the track. The FIG. **1** embodiment is externally electrified by means of a power source generally indicated by reference character **18**, this power source being in the form of a battery or a transformer connected to an AC power supply. In any event, the power source is connected by a lead **20** through one of the legs **16** to a conductive strip **22** attached to the track **12**.

As best shown in FIG. **2**, the track **12** is comprised of a planar center portion **24** with a Y-shaped monorail portion **26** extending from opposite sides and along the center line thereof. Each monorail section is comprised of a perpendicular rib **28** having a pair of extending arms **30** and **32** in a Y configuration. The width of the center section **24** exceeds the width of the arms to provide a pathway along the marginal edges of the center section for wheels **34** on the vehicle **14**. Preferably, the electrical conduit **22** is imbedded along the underside of one of the arms **30** or **32** and may be connected to the lead **20** through a conductive strip **36** imbedded across the track in the vicinity of one of the legs. The legs **16** will be seen to be connected to the outer edges of the center section **24** to provide clearance for the vehicle as it moves about the track.

The monorail section of the track defines an outwardly facing V groove **38** which receives a driving wheel **40** mounted to the vehicle **14** and operated by means of a motor **42** within the vehicle, drivingly connected to the wheel **40** through bevel gears **44**. The driving wheel **40** preferably is formed with peripheral teeth **46** which mesh with rack teeth **48** formed along the base of the groove **38** for positive driving traction. The vehicle **14** is movably restrained on the monorail track by means of a pair of diagonally set rollers **50** and **52** which bear against the undersides of the leg portions, **30** and **32** of the monorail. The rollers are carried on angularly set shafts **54** and **56** mounted to the vehicle's body by brackets **58** and **60**. The roller **50**, at least, is electrically conductive and rides along the conductive strip **22** and through its conductive shaft **54** is connected via a lead **62** to the motor. In this fashion, the motor is energized continuously as it moves about the track. The roller **52** and the shaft **56** are mounted for axial movement to permit the vehicle to be disengaged from the monorail. The roller and shaft are normally extended into the operating position shown by means of a coil spring **64** but is readily retracted to permit the vehicle to be disconnected.

While the vehicle is illustrated in the form of an insect, obviously it may take any one of a variety of forms such as train, car, rocket or other fanciful configuration calculated to enhance the demonstration. Also, while the illustrated track is in the form of a monorail, certain modifications may be made for constraining the vehicle to the surface. For example, the track could be formed with a channel adapted to receive driving wheels which, in turn, could be geared to mesh with a cooperating rack track. Also, a monorail could be provided in which rack teeth are formed along the sides of a T-shaped rail and cooperating gears on the vehicle could mesh with the track. Further, a flat rail could be attached to the center portion by spaced posts or the like instead of the integrated monorail of the principal embodiment.

Numerous variations can be made with respect to different type track systems. Another arrangement for restraining the vehicle to the track could involve the use of magnets wherein the track is composed of a magnetic material while the vehicle is equipped with magnets of sufficient strength to hole it on the track in any position. A simple frictional drive mechanism and suitable guide would be provided for directional control of the vehicle. A further variation would include rotating suction cups driven by a spring, a battery or electrical motor on the vehicle, the suction cups advancing the vehicle as a rotating arm structure is driven by the motor. Yet a further modification could include a moving belt or chain guided in a suitable groove extending about the track. The vehicle would attach to the moving belt to be carried about the track surface.

Various types of propelling arrangements may be provided for the vehicle other than the motor and electrical system illustrated. For example, spring-wound motors or battery-operated motors in which the battery is carried along with the vehicle may be provided. Furthermore, the track itself may be fabricated in sections, each section perhaps constituting a quarter, eight or tenth of a circle or ellipse. For the conventional one-half twist Mobius strip each section must be uniformly twisted $f \times 180°$ where f is the fraction the section is of the total circuit. FOr a complete twist Mobius strip, the twist per strip is $f \times 360°$. The several sections may be joined together by a variety of connections such as cooperating tongues and grooves, connecting hooks, or posts on one end and fitting into cooperating holes on an adjoining piece.

Having thus described the invention what I claim and desire to obtain by Letters Patent of the United States is:

1. A dynamic Mobius band, comprising in combination

a. a self-supporting track in the form of a Mobius band,

b. a vehicle mounted to said track for movement therealong, and

c. guide means cooperatively connecting said vehicle and said track for maintaining said vehicle on said track.

2. A dynamic Mobius band according to claim 1 wherein said vehicle is self-propelled.

3. A dynamic Mobius band according to claim 1 wherein said track is substantially rigid.

4. A dynamic Mobius band according to claim 3 including support means for said track.

5. A dynamic Mobius band according to claim 1 wherein said guide means includes a rail extending along said track and engageable with said vehicle.

6. A dynamic Mobius band according to claim 6 wherein said rail is a mono rail extending along the centerline of said track.

7. A dynamic Mobius band according to claim 5 including an electrical conduit forming a continuous electrical path about said track, power means for energizing said conduit, and electrical motor in said vehicle for propulsion thereof and contact means on said vehicle for moving electrical engagement with said conduit.

8. A dynamic Mobius band according to claim 1 wherein said track is comprised of detachable sections.

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