more apparent from the following detailed description of several embodiments which proceeds with reference to the accompanying figures.

BRIEF DESCRIPTION OF THE FIGURES

[0035] **FIG. 1** is a schematic illustration of one embodiment of the molecular motor, in which actin is directionally applied on an outer surface of a solid internal cylinder, myosin is coated on an internal surface of a surrounding complementary hollow cylinder, and rotation of the internal cylinder drives a rotary gear. Portions of the outer cylinder are broken away to illustrate that the arrays of actin and myosin extend along the length of the device.

[0036] **FIG. 2** is a schematic illustration similar to **FIG. 1**, but wherein the surfaces are on cones instead of cylinders.

[0037] **FIG. 3A** is a side elevational and **FIG. 3B** is a cross sectional schematic end view of an alternative embodiment of the disclosure in which the layer of actin surrounds the myosin layer, the inner cylinder is fixed to a stationary bracket, and rotation of the outer cylinder rotates a propeller.

[0038] **FIGS. 4A through 4D** are successive schematic views illustrating a conventional view of the interaction of actin and a single myosin head, to demonstrate how an actin coated surface is moved by the myosin.

[0039] **FIGS. 5A through 5E** are schematic end views of cylinders similar to those shown in **FIG. 1**, showing a subset of myosin heads that change conformation substantially in concert to move the internal actin coated cylinder of the motor. Other myosin heads (not shown) are randomly moving through different stages of the conformational changes, without necessarily moving in concert, but only a single subset of myosin heads have been shown for purposes of explanation.

[0040] **FIG. 6** is a schematic side view of an alternative embodiment of the motor having multiple, nested, concentric complementary cylinders on which the actin and myosin are coated.

[0041] **FIG. 7A** is a schematic end perspective view of two interengaging complementary cylinders that can be interengaged to assemble a molecular motor of the present disclosure.

[0042] **FIG. 7B** is a side view of the complementary cylinders of **FIG. 4**, illustrating the differing outer diameters of the two cylinders.

[0043] **FIG. 8** is a schematic illustration of one embodiment of the molecular motor, in which ATP is supplied from a reservoir. Separate feed lines are used to supply the ATP to the motor. Each feed line (ATP_1, ATP_2, and ATP_3) has a control switch or valve (designated "X" on the ATP_1, ATP_2, and ATP_3 feed lines). In one embodiment, the control valves are separately controlled.

[0044] **FIG. 9** is a schematic illustration of another embodiment of the molecular motor, which includes separate units in series. In this embodiment, segments of a molecular motor, separated by impermeable barriers, are connected in series by a shaft. The barrier is designed to prevent diffusion between the molecular motor units. In this embodiment, ATP is supplied from a reservoir through separate feed lines (designated ATP_1, ATP_2, ATP_3 and ATP_4). Each feed line (ATP_1, ATP_2, ATP_3 and ATP_4) has a separately controlled switch or valve (designated "X" on ATP_1, ATP_2, ATP_3 and ATP_4 feed lines).

[0045] **FIG. 10** is a schematic illustration of another embodiment of the molecular motor wherein actin and myosin, respectively, are coated on opposing axially aligned annular substrate surfaces.

[0046] **FIG. 11** is a cross-section side view of a further embodiment of a molecular motor that includes discs coated with actin and myosin.

[0047] **FIGS. 12A and 12B** are each plan views of disc embodiments that could be used in the molecular motor shown in **FIG. 10** or **11**. **FIG. 12A** shows actin directionally applied on one surface of the disc. **FIG. 12B** shows myosin applied on one surface of the disc.

[0048] **FIG. 13** is a schematic view of a molecular motor embodiment similar to that shown in **FIG. 10** or **11** wherein rings are substituted for the discs. **FIG. 13** includes a plan view of the rings and a side view of multiple ring layers wherein the spatial correspondence between the two views is illustrated by dashed lines.

[0049] **FIG. 14** is a cross-section side view of another variant of the molecular motor depicted in **FIG. 1** or **FIG. 2**.

[0050] **FIG. 15** is a cross-section side view of a further variant of the molecular motor depicted in **FIG. 1** or **FIG. 2**.

DETAILED DESCRIPTION OF SEVERAL EMBODIMENTS

[0051] Definitions

[0052] The following definitions and methods are provided to better describe the present disclosure and to guide those of ordinary skill in the art in the practice of the present disclosure. Definitions of common terms may also be found in Rieger et al., *Glossary of Genetics: Classical and Molecular,* 5th edition, Springer-Verlag: New York, 1991; and Lewin, Genes V, Oxford University Press: New York, 1994. The standard one and three letter nomenclature for amino acid residues is used (such as H or His for Histidine).

[0053] Additional definitions of terms commonly used in molecular genetics can be found in Benjamin Lewin, *Genes V* published by Oxford University Press, 1994 (ISBN 0-19-854287-9); Kendrew et al (eds.), *The Encyclopedia of Molecular Biology,* published by Blackwell Science Ltd., 1994 (ISBN 0-632-02182-9); and Robert A. Meyers (ed.), *Molecular Biology and Biotechnology: a Comprehensive Desk Reference,* published by VCH Publishers, Inc., 1995 (ISBN 1-56081-569-8).

[0054] As used in this specification and the appended claims, the singular forms "a,""an," and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to a motor comprising "a cylinder" includes a system containing one or more cylinders, and reference to "a motor protein" includes reference to one or more motor proteins.

[0055] Micromachining, micromachined, and similar terms refer to the processes used to create micrometer-sized