peripheral surface **452** of first cylinder **445** and peripheral surface **451** of second cylinder **444**. The first loop substrate **441** is disposed within a first internal radius **455** of a second flexible loop substrate **442**. A third cylinder **443** is disposed within a second internal radius **456** of the second loop substrate **442**. The second loop substrate **442** defines an inner surface **446** and an outer surface **447**. The inner surface **446** is in contact with, and supported by, peripheral surface **450** of third cylinder **443** and the outer surface **449** of the first loop substrate **441**. At least one of the second and third cylinders **444**, **443** are rotatable and may be coupled to a drive member (not shown) in a manner similar to that depicted, for example, in **FIG. 1**. First cylinder **445** is stationary. At least one of the first, second and third cylinders **445**, **444**, **443** also may be extended and coupled to a base member (not shown) for supporting the molecular motor **440**. A drive member such as a belt (not shown) may also be engaged with the outer surface **447** of the second loop substrate **442**.

[**0162**] The peripheral surface **452** of the first cylinder **445** is coated with a motor protein (e.g., myosin) and the inner surface **448** of the first loop substrate **441** is coated with a complementary motor protein (e.g., directionally applied actin). The outer surface **449** of the first loop substrate **441** also is coated with a motor protein (e.g., directionally applied actin) and the inner surface **446** of the second loop substrate **442** is coated with a complementary motor protein (e.g., myosin). The actin/myosin interaction upon exposure to ATP moves the first loop substrate **441** relative to the second loop substrate **442**. Movement of the first loop substrate **441** and/or second loop substrate **442** rotates at least one of the second or third cylinders **444, 443**. Second loop substrate **442** may be provided with perforations (not shown) for introducing an ATP-containing liquid between the inner surface **446** of the second loop substrate **442** and the outer surface **449** of the first loop substrate **441**.

[**0163**] Additional nested loop substrates may be provided to increase the rotational velocity of the outer loop substrate. Increasing the width of the loop substrates can increase the power of the molecular motor **440**.

[**0164**] With reference to **FIG. 15, a** molecular motor **470** is shown that includes a cylinder **472** disposed within a first internal radius **478** defined by a flexible loop substrate **471**. A plurality of stationary posts or stanchions **473** are disposed within second radii **479** defined by the loop substrate **471**. According to particular embodiments, there are at least three posts **473** so that the loop substrate follows a serpentine path. Each post **473** defines an outer surface **477**. The loop substrate **471** defines an inner surface **474** and an outer surface **475**. The inner surface **474** is in contact with, and supported by, peripheral surface **476** of cylinder **472** and the outer surfaces **477** of the posts **473**. The cylinder **472** may be stationary or rotatable. If the cylinder **472** is rotatable, it may be coupled to a drive member (not shown). A drive member (not shown) may also be engaged with the loop substrate **471**. For example, the edges of the loop substrate **471** may define gear teeth (not shown) for engaging with a driven member (not shown). Such gear teeth may also assist in supporting the molecular motor **470**.

[**0165**] The outer surface **477** of each stationary post **473** is coated with a motor protein (e.g., myosin). The inner surface **474** and the outer surface **475** of the loop substrate **471** are coated with a complementary motor protein (e.g., directionally applied actin). The actin/myosin interaction upon exposure to ATP moves the loop substrate **471** relative to the posts **473** and, thus, moves any coupled drive members. The loop substrate **471** may be provided with perforations (not shown) for introducing an ATP-containing liquid between the surfaces **474**, **475** of the loop substrate **471** and the outer surfaces **477** of the posts **473**. Increasing the width of the loop substrate **471**, the contact length between the outer surfaces **477** of the posts **473** and the surfaces **474**, **475** of the loop substrate **471**, and/or increasing the number of posts **473** can increase the power of the molecular motor **470**.

[**0166**] The motor protein-coated loop substrate shown in the embodiments of **FIGS. 14 and 15** can be made by passing the loop substrate through a bath(s) that includes the desired motor protein. The motor protein-coated loop substrate may be placed around the support cylinders. The tension of each individual loop then may be adjusted accordingly.

[**0167**] In view of the many possible embodiments to which the principles of our disclosure may be applied, it should be recognized that the illustrated embodiment is only a particular example of the disclosure and should not be taken as a limitation on the scope of the disclosure. Rather, the scope of the disclosure is defined by the following claims.

We claim:

1. A molecular rotary motor comprising:

a first two dimensional array of a first motor protein;

a second two dimensional array of a second motor protein that interacts with the first motor protein to move directionally relatively to the first array; and

wherein the first and second arrays of motor proteins are in sufficiently close contact to interact and move the second array relative to the first array.

2. The molecular motor of claim 1, further comprising a driven member moved by the directional movement of the second array.

3. The molecular motor of claim 1, further comprising multiple nested first and second arrays that interact with one another to directionally move the first and second arrays relative to one another.

4. The molecular motor of claim 1, wherein each two dimensional array is a curved surface.

5. The molecular motor of claim 4, wherein each curved surface is a continuous curved surface.

6. The molecular motor of claim 5, wherein each curved surface is a complementary shaped cylindrical or conical surface.

7. The molecular motor of claim 6, comprising a plurality of nested cylindrical or conical members, the surfaces thereof forming the complementary curved surfaces.

8. The molecular motor of claim 1, wherein the first motor protein is actin and the second motor protein is myosin.

9. The molecular motor of claim 1, further comprising a source of ATP.

10. The molecular motor of claim 1, further comprising perforations in surfaces on which the arrays are disposed, to allow permeation of an ATP containing liquid through the surfaces to the motor proteins.