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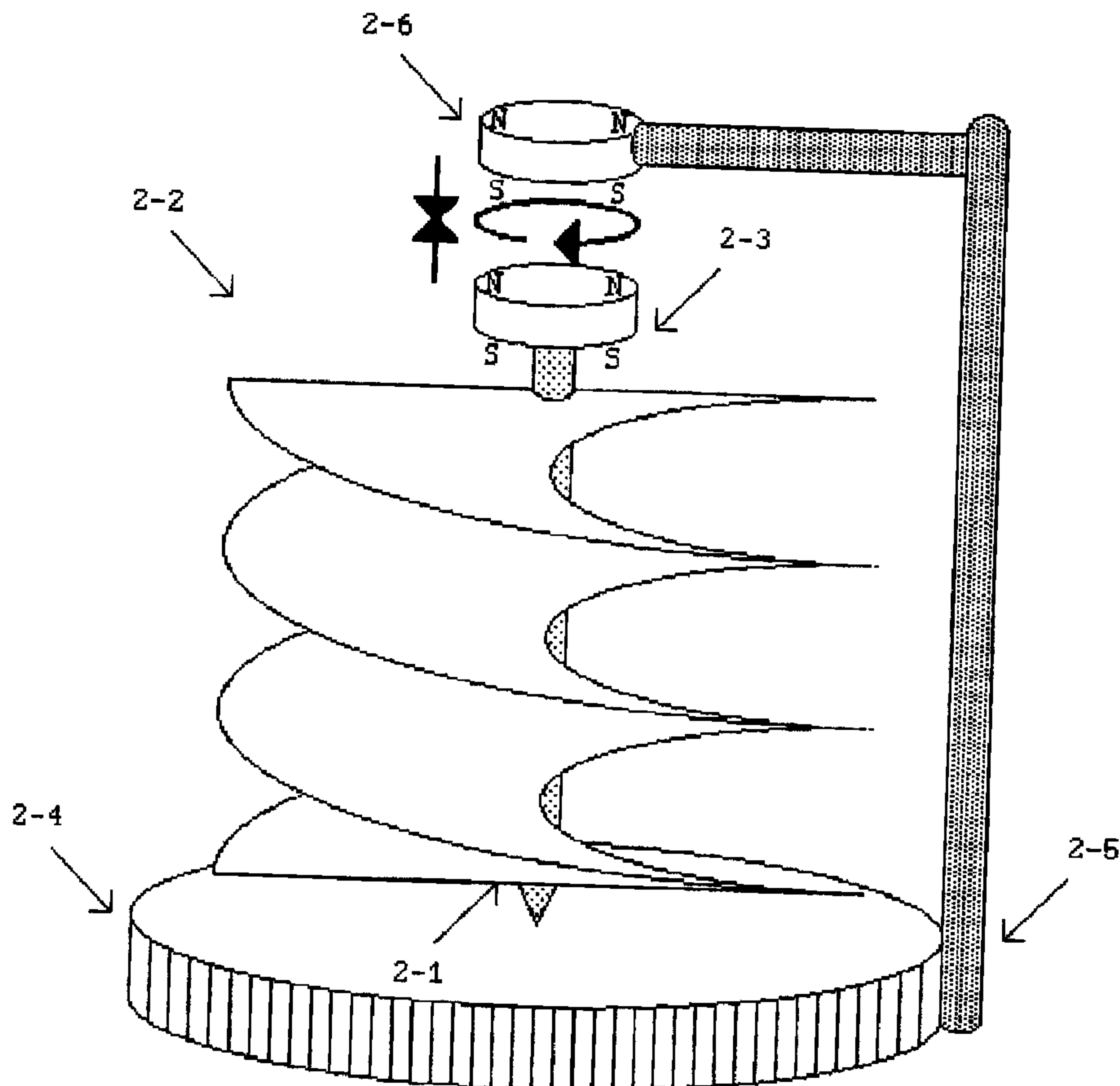
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(54) Titre : DISPOSITIF D'AFFICHAGE EOLIEN A ERECTION MAGNETIQUE

(54) Title: MAGNETICALLY ERECTED WIND-EFFECT DISPLAY DEVICE



(57) Abrégé/Abstract:

• A magnetically erected wind-effect display device comprises a rotor assembly having a central axis of rotation, and a stator assembly. The rotor assembly comprises a vertical shaft, a wind-effect element, and a rotor magnet. The stator assembly

(57) Abrégé(suite)/Abstract(continued):

comprises a base, a mount, and a stator magnet. The vertical shaft of the rotor assembly is passively erected by a magnetic attraction force between the rotor magnet and the stator magnet. The wind-effect element of the rotor assembly is capable of rotating around the central axis of rotation by an external force exerted by wind pressure. This invention relates to wind-effect display devices, and the principal use of the invention is for wind gauges and for decoration.

Abstract

- A magnetically erected wind-effect display device comprises a rotor assembly having a central axis of rotation, and a stator assembly. The rotor assembly comprises a vertical shaft, a wind-effect element, and a rotor magnet. The stator assembly comprises a base, a mount, and a stator magnet. The vertical shaft of the rotor assembly is passively erected by a magnetic attraction force between the rotor magnet and the stator magnet. The wind-effect element of the rotor assembly is capable of rotating around the central axis of rotation by an external force exerted by wind pressure. This invention relates to wind-effect display devices, and the principal use of the invention is for wind gauges and for decoration.

Description

Title

- **Magnetically Erected Wind-Effect Display Device**

Technical Field

- This invention relates to wind-effect display devices, more particularly to a magnetic wind-effect display device.

Background Art

- There are many instances where it would be desirable to be able to demonstrate wind effects by a display device.
- A number of patents disclose display devices in which an object is levitated by magnets.
- **U.S. Patent 4 382 245** discloses "Levitation device", or Levitron (Trade Mark). This prior art has a dish-shaped permanent magnet in one form with an upper surface of a first polarity and a lower surface of a second polarity disposed in co-axial relationship to a second magnet having the opposite polar relationships.
- **U.S. Patent 4 753 623** discloses "Magnetic spinner device". This prior art is a magnetically operated rotative amusement device or unit of a substantially self-starting nature having a see-through or transparent container or bowl-like support base provided with a lower, centrally disposed, pivot-receiving socket.
- **U.S. Patent 5 182 533** discloses "Magnetically levitated spinning axel display apparatus". This prior art has polarity configurations of the rod magnets and the base magnets being repulsive to one another to permit free floating levitation of the rod above the base and to generate a longitudinal lateral force sufficient to keep a rod end contacted with the upstanding axle support.
- **U.S. Patent 5 589 721** discloses "Display apparatus utilizing magnetic interaction". This prior art utilises magnetic interaction to achieve suspension and electromagnetic interaction to maintain continuous motion.
- These prior art arrangements do not have a wind-effect display device having a vertical shaft, and a wind-effect element passively erected by a magnetic attraction or repulsion force between 2 permanent magnets.

Description of the Invention

- It is a primary object of the invention to provide a wind-effect display device having a vertical shaft.
- It is another object of the invention to provide a wind-effect display device whose wind-effect element is passively erected by a magnetic attraction force between 2 permanent magnets.
- It is another object of the invention to provide a wind-effect display device whose wind-effect element is passively erected by a magnetic repulsion force between 2 permanent magnets.
- A magnetically erected wind-effect display device comprises a rotor assembly having a central axis of rotation, and a stator assembly. The rotor assembly comprises a vertical shaft, a wind-effect element, and a rotor magnet. The stator assembly comprises a base, a mount, and a stator magnet. The vertical shaft of the rotor assembly is passively erected by a magnetic attraction force between the rotor magnet and the stator magnet. The wind-effect element of the rotor assembly is capable of rotating around the central axis of rotation by an external force exerted by wind pressure.

Brief Description of the Figures in the Drawings

- In drawings which illustrate embodiments of the invention:
 - **Figure 1** marked "**Prior Art**" is a perspective view of a conventional magnetic display device;
 - **Figure 2** is a perspective view of one embodiment of a wind-effect display device according to the invention;
 - **Figure 3** is a perspective view of another embodiment of a wind-effect display device according to the invention; and
 - **Figure 4** is a perspective view of another embodiment of a wind-effect display device according to the invention.

Modes for Carrying Out the Invention

- One conventional magnetic display device shown in **Figure 1** marked "**Prior Art**" comprises a base assembly and an axle assembly.
- The base assembly includes a base platform member 1-1 having a plurality of base magnets 1-2 that are disposed spaced apart along an upper surface thereof. The platform member 1-1

has an upstanding wall forming an axle support member 1-3 disposed at one end.

- The axle assembly includes a plurality of disc shaped magnets 1-4 disposed spaced apart along the rod 1-5 and coordinate with individual ones of the base magnets 1-2 when a first or second rod end portion is engaged in abutting contact with the upstanding axle support member 1-3.
- This conventional magnetic display device permits free floating levitation of the rod above the base and to generate a longitudinal lateral force sufficient to keep a rod end contacted with the upstanding axle support, but does not have a wind-effect element which is capable of rotating around a central axis of rotation by an external force exerted by wind pressure.
- In one embodiment of the invention shown in **Figure 2**, a wind-effect display device comprises a rotor assembly having a central axis of rotation, and a stator assembly.
- The rotor assembly comprises a vertical shaft 2-1 made of a non-magnetic material, a wind-effect element 2-2 made of a non-magnetic material, and a rotor magnet 2-3. The vertical shaft 2-1 has a top portion, a middle portion and a bottom portion. The bottom portion of the vertical shaft 2-1 has a pointed tip. The wind-effect element 2-2 is securely attached to the middle portion of the vertical shaft 2-1. The rotor magnet 2-3 is securely attached to the top portion of the vertical shaft 2-1.
- The stator assembly comprises a base 2-4, a mount 2-5, and a stator magnet 2-6. The base 2-4 has a central portion and a peripheral portion. The central portion of the base 2-4 rotatably supports the pointed tip of the bottom portion of the vertical shaft 2-1. The mount 2-5 is securely attached to the peripheral portion of the base 2-4, and upwardly extends from the base 2-4. The stator magnet 2-6 is securely attached to the mount 2-5, and is co-axially placed above the rotor magnet 2-3.
- The vertical shaft 2-1 of the rotor assembly is passively erected by a magnetic attraction force between the rotor magnet 2-3 and the stator magnet 2-6. The wind-effect element 2-2 of the rotor assembly is capable of rotating around the central axis of rotation by an external force exerted by wind pressure.
- Effective weight reduction of the wind-effect element 2-2 due to a magnetic attraction force between the rotor magnet 2-3 and the stator magnet 2-6 permits the wind-effect element 2-2 to have higher sensitivity, and to react to a gentle breeze.

- The wind-effect element 2-2 of the rotor assembly in **Figure 2** may be a helical vane, a revolving-cup anemometer, a wind-direction indicator, Darrieus vertical-axis wind turbine blades, etc.
- The wind-effect element 2-2 of the rotor assembly in **Figure 2** may be overlaid with a decorative figurine, such as a dancing ballerina.
- Preferably, the rotor magnet 2-3 of the rotor assembly is made of rare-earth permanent magnet. The rotor magnet 2-3 of the rotor assembly may be ring-shaped, disc-shaped, or rod-shaped.
- Preferably, the stator magnet 2-6 of the stator assembly is made of rare-earth permanent magnet. The stator magnet 2-6 of the stator assembly may be ring-shaped, disc-shaped, or rod-shaped.
- In another embodiment of the invention shown in **Figure 3**, a wind-effect display device comprises a rotor assembly having a central axis of rotation, and a stator assembly.
- The rotor assembly comprises a vertical shaft 3-1 made of a non-magnetic material, a wind-effect element 3-2 made of a non-magnetic material, and a rotor magnet 3-3. The vertical shaft 3-1 has a top portion, a middle portion and a bottom portion. The wind-effect element 3-2 is securely attached to the top portion of the vertical shaft 3-1. The rotor magnet 3-3 is securely attached to the bottom portion of the vertical shaft 3-1.
- The stator assembly comprises a base 3-4, a mount 3-5, a stator magnet 3-6, and at least one bearing assembly 3-7. The base 3-4 has a central portion and a peripheral portion. The mount 3-5 is securely attached to the peripheral portion of the base 3-4, and upwardly extends from the base 3-4. The stator magnet 3-6 is securely attached to the central portion of the base 3-4, and is co-axially placed below the rotor magnet 3-3. The bearing assembly 3-7 is securely attached to the mount 3-5, and is co-axially placed above the stator magnet 3-6.
- The vertical shaft 3-1 of the rotor assembly is passively erected by a magnetic repulsion force between the rotor magnet 3-3 and the stator magnet 3-6. The wind-effect element 3-2 of the rotor assembly is capable of rotating around the central axis of rotation by an external force exerted by wind pressure.
- Effective weight reduction of the wind-effect element 3-2 due to a magnetic repulsion force between the rotor magnet 3-3 and the stator magnet 3-6 permits the wind-effect element 3-2

to have higher sensitivity, and to react to a gentle breeze.

- The wind-effect element 3-2 of the rotor assembly in **Figure 3** may be a helical vane, a revolving-cup anemometer, a wind-direction indicator, Darrieus vertical-axis wind turbine blades, etc.
- The wind-effect element 3-2 of the rotor assembly in **Figure 3** may be overlaid with a decorative figurine, such as a dancing ballerina.
- Preferably, the rotor magnet 3-3 of the rotor assembly is made of rare-earth permanent magnet. The rotor magnet 3-3 of the rotor assembly may be ring-shaped, disc-shaped, or rod-shaped.
- Preferably, the stator magnet 3-6 of the stator assembly is made of rare-earth permanent magnet. The stator magnet 3-6 of the stator assembly may be ring-shaped, disc-shaped, or rod-shaped.
- In another embodiment of the invention shown in **Figure 4**, a wind-effect display device comprises a rotor assembly having a central axis of rotation, and a stator assembly.
- The rotor assembly comprises a vertical shaft 4-1 made of a non-magnetic material, a wind-effect element 4-2 made of a non-magnetic material, and a rotor magnet 4-3. The vertical shaft 4-1 has a top portion, a middle portion and a bottom portion. The wind-effect element 4-2 is securely attached to the top portion of the vertical shaft 4-1. The rotor magnet 4-3 is securely attached to the middle portion of the vertical shaft 4-1.
- The stator assembly comprises a base 4-4, a mount 4-5, a ring-shaped stator magnet 4-6, and at least two bearing assemblies 4-7. The base 4-4 has a central portion and a peripheral portion. The mount 4-5 is securely attached to the peripheral portion of the base 4-4, and upwardly extends from the base 4-4. The ring-shaped stator magnet 4-6 is securely attached to the mount 4-5, and is co-axially placed below the rotor magnet 4-3. The two bearing assemblies 4-7 are securely attached to the mount 4-5. At least one bearing assembly 4-7 is co-axially placed above the stator magnet 4-6, and at least one bearing assembly 4-7 is co-axially placed below the stator magnet 4-6.
- The vertical shaft 4-1 of the rotor assembly is passively erected by a magnetic repulsion force between the rotor magnet 4-3 and the stator magnet 4-6. The wind-effect element 4-2 of the rotor assembly is capable of rotating around the central axis of rotation by an external force exerted by wind pressure.

- Effective weight reduction of the wind-effect element 4-2 due to a magnetic repulsion force between the rotor magnet 4-3 and the stator magnet 4-6 permits the wind-effect element 4-2 to have higher sensitivity, and to react to a gentle breeze.
- The wind-effect element 4-2 of the rotor assembly in **Figure 4** may be a helical vane, a revolving-cup anemometer, a wind-direction indicator, Darrieus vertical-axis wind turbine blades, etc.
- The wind-effect element 4-2 of the rotor assembly in **Figure 4** may be overlaid with a decorative figurine, such as a dancing ballerina.
- Preferably, the rotor magnet 4-3 of the rotor assembly is made of rare-earth permanent magnet. The rotor magnet 4-3 of the rotor assembly may be ring-shaped, disc-shaped, or rod-shaped.
- Preferably, the stator magnet 4-6 of the stator assembly is made of rare-earth permanent magnet.

Claims

- The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A wind-effect display device, comprising:

- a rotor assembly having a central axis of rotation, comprising:
 - a vertical shaft made of a non-magnetic material, having a top portion, a middle portion and a bottom portion, the bottom portion of the vertical shaft having a pointed tip;
 - a wind-effect element made of a non-magnetic material, securely attached to the middle portion of the vertical shaft; and
 - a rotor magnet securely attached to the top portion of the vertical shaft; and
- a stator assembly comprising:
 - a base having a central portion and a peripheral portion, the central portion rotatably supporting the pointed tip of the bottom portion of the vertical shaft;
 - a mount securely attached to the peripheral portion of the base, upwardly extending from the base; and
 - a stator magnet securely attached to the mount, co-axially placed above the rotor magnet;

the vertical shaft of the rotor assembly being passively erected by a magnetic attraction force between the rotor magnet and the stator magnet, and the wind-effect element of the rotor assembly being capable of rotating around the central axis of rotation by an external force exerted by wind pressure.

2. A wind-effect display device, comprising:

- a rotor assembly having a central axis of rotation, comprising:
 - a vertical shaft made of a non-magnetic material, having a top portion, a middle portion and a bottom portion;
 - a wind-effect element made of a non-magnetic material, securely attached to the top portion of

the vertical shaft; and

- a rotor magnet securely attached to the bottom portion of the vertical shaft; and
- a stator assembly comprising:
 - a base having a central portion and a peripheral portion;
 - a mount securely attached to the peripheral portion of the base, upwardly extending from the base;
 - a stator magnet securely attached to the central portion of the base, co-axially placed below the rotor magnet; and
 - at least one bearing assembly securely attached to the mount, co-axially placed above the stator magnet;

the vertical shaft of the rotor assembly being passively erected by a magnetic repulsion force between the rotor magnet and the stator magnet, and the wind-effect element of the rotor assembly being capable of rotating around the central axis of rotation by an external force exerted by wind pressure.

3. A wind-effect display device, comprising:

- a rotor assembly having a central axis of rotation, comprising:
 - a vertical shaft made of a non-magnetic material, having a top portion, a middle portion and a bottom portion;
 - a wind-effect element made of a non-magnetic material, securely attached to the top portion of the vertical shaft; and
 - a rotor magnet securely attached to the middle portion of the vertical shaft; and
- a stator assembly comprising:
 - a base having a central portion and a peripheral portion;
 - a mount securely attached to the peripheral portion of the base, upwardly extending from the base;
 - a ring-shaped stator magnet securely attached to the mount, co-axially placed below the rotor magnet; and

- at least two bearing assemblies securely attached to the mount, at least one bearing assembly co-axially placed above the stator magnet, at least one bearing assembly co-axially placed below the stator magnet;

the vertical shaft of the rotor assembly being passively erected by a magnetic repulsion force between the rotor magnet and the stator magnet, and the wind-effect element of the rotor assembly being capable of rotating around the central axis of rotation by an external force exerted by wind pressure.

4. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the wind-effect element of the rotor assembly is a helical vane.
5. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the wind-effect element of the rotor assembly is a revolving-cup anemometer.
6. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the wind-effect element of the rotor assembly is a wind-direction indicator.
7. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the wind-effect element of the rotor assembly is Darrieus vertical-axis wind turbine blades.
8. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the wind-effect element of the rotor assembly is overlaid with a decorative figurine.
9. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the rotor magnet of the rotor assembly is made of rare-earth permanent magnet.
10. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the rotor magnet of the rotor assembly is ring-shaped.
11. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the rotor magnet of the rotor assembly is disc-shaped.
12. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the rotor magnet of the rotor assembly is rod-shaped.
13. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the stator magnet of the stator assembly is made of rare-earth permanent magnet.

14. A wind-effect display device as defined in claim 1 or claim 2 or claim 3, in which the stator magnet of the stator assembly is ring-shaped.
15. A wind-effect display device as defined in claim 1 or claim 2, in which the stator magnet of the stator assembly is disc-shaped.
16. A wind-effect display device as defined in claim 1 or claim 2, in which the stator magnet of the stator assembly is rod-shaped.

Figure 1 (Prior Art)

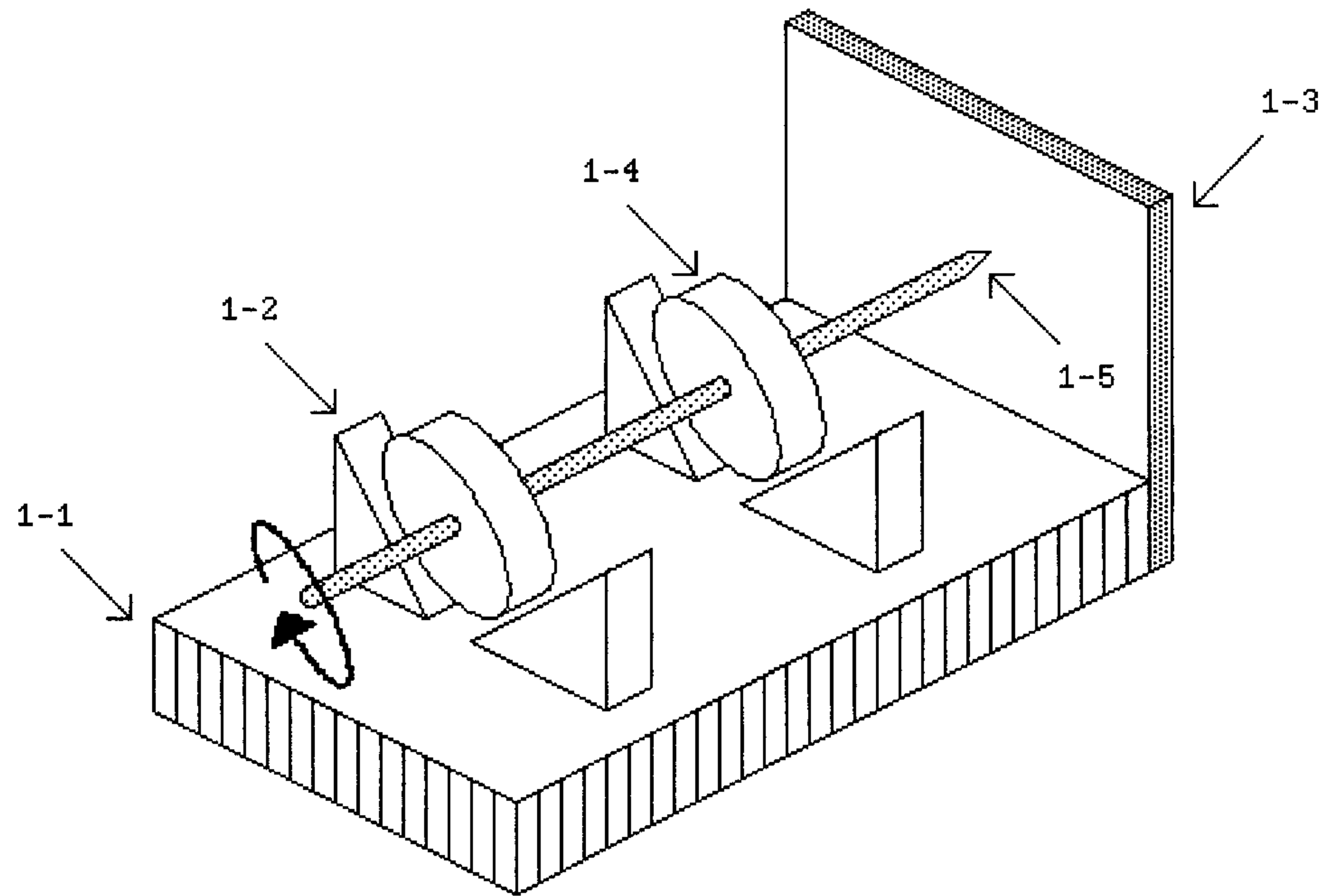


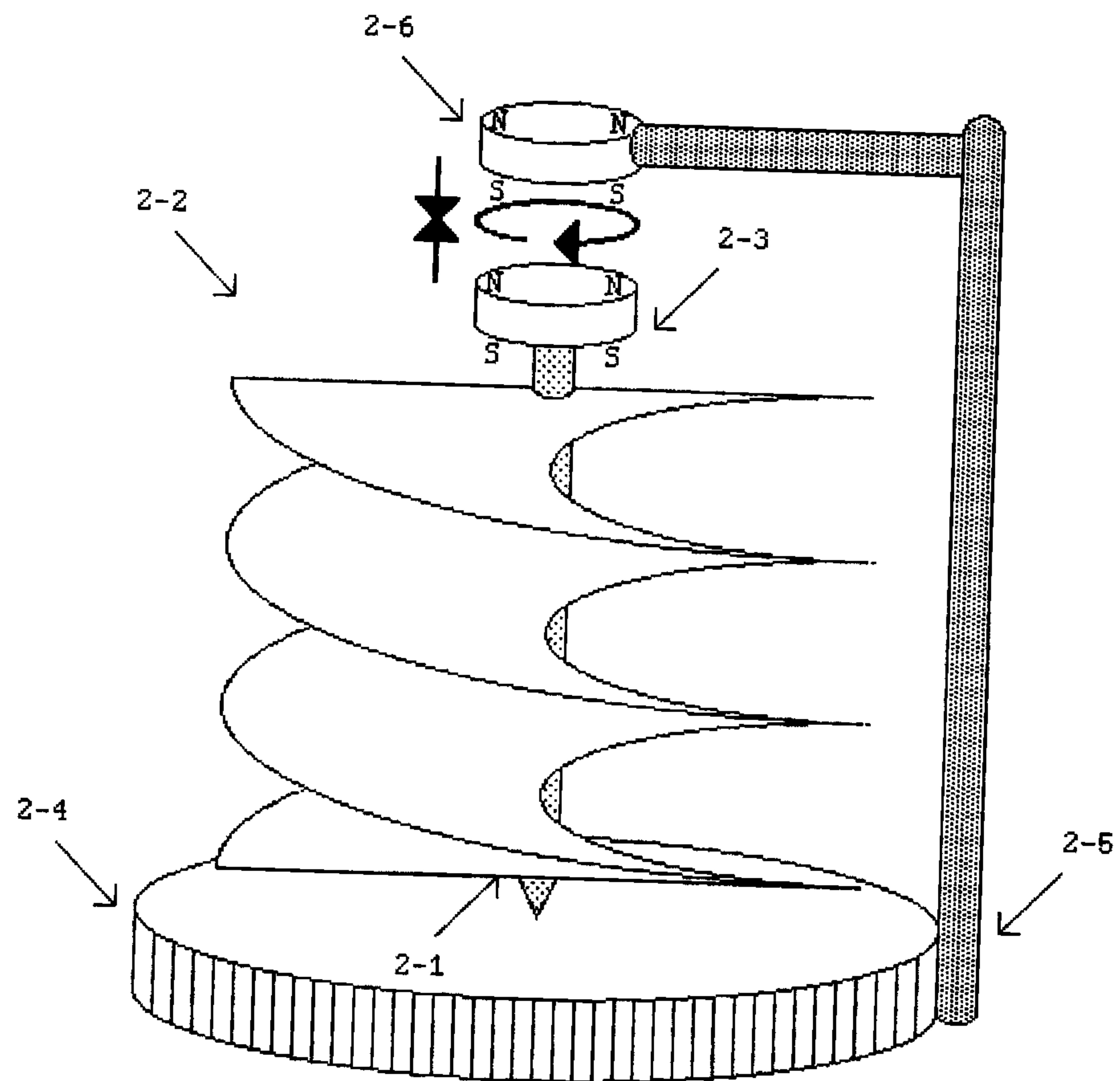
Figure 2

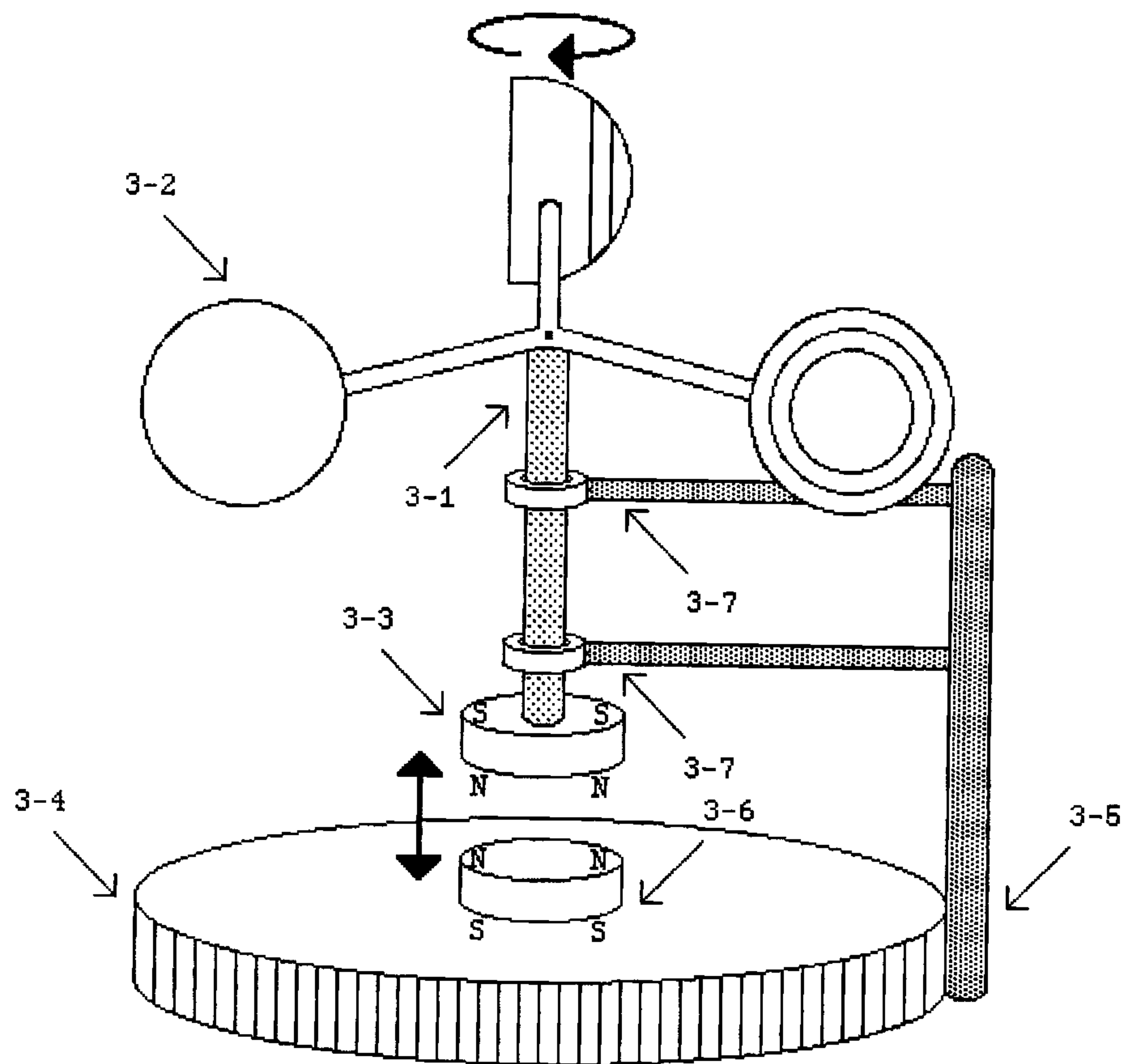
Figure 3

Figure 4