

limit, the supply energy is limited, and the amplitude is restrained when this energy becomes equal to energy to be consumed. The potential energy by the permanent magnets is independent of the dynamic energy within the system. The difference between the potential energy from the permanent magnets and the energy to be consumed can be increased by increasing the maximum energy product per unit mass of the permanent magnets. Because of this, the amount of energy converted to vibration energy in one cycle can be increased by making, the supply energy produced by negative damping greater than the energy consumed by the damping in the particular cycle.

As described above, it is possible to freely control the damping coefficient r and the spring constant (coefficient) k in the equation (1). In the schematic diagram of FIG. 1, for example, the amplitude can be attenuated by maximizing the opposing area of the permanent magnets 2 and 4 when the permanent magnet 4 is positioned at its lower end. This feature is applicable to a magnetic brake, dynamic damper or the like. On the other hand, the repulsive force can be increased by maximizing the opposing area when the permanent magnet 4 is moved from its lower end towards its upper end. This feature is applicable to a generator, amplifier or the like.

Although the present invention has been fully described by way of examples with reference to the accompanying drawings, it is to be noted here that various changes and modifications will be apparent to those skilled in the art. Therefore, unless such changes and modifications otherwise depart from the spirit and scope of the present invention, they should be construed as being included therein.

What is claimed is:

1. A magnet-spring apparatus comprising:

only one first movable permanent magnet having a magnetic pole of a first polarity and a magnetic pole of a second polarity, operable to receive an input;

only one second movable permanent magnet, having a magnetic pole of the first polarity and a magnetic pole of the second polarity, spaced from said first permanent magnet and oriented such that the magnetic pole of the first polarity of said second permanent magnet is opposed to the magnetic pole of the first polarity of said first permanent magnet so as to exhibit a magnetic field between said first permanent magnet and said second permanent magnet; and

an overlap area changing device operable to change an overlapping area of said first and second permanent magnets so as to effect a change in magnetic energy of the magnetic field between said first and second permanent magnets;

wherein said second permanent magnet is operable to produce a reciprocating movement output in response to both the input received by said first permanent magnet and the change in magnetic energy of the magnetic field between said first and second permanent magnets.

2. A magnet-spring apparatus as claimed in claim 1, wherein said first permanent magnet is operable to be rotated by the input and said second permanent magnet is operable to slide vertically in response to both the input received by said first permanent magnet and the change in magnetic energy of the magnetic field between said first permanent magnet and said second permanent magnet.

3. A magnet-spring apparatus comprising:

only one first movable permanent magnet having a magnetic pole of a first polarity and a magnetic pole of a second polarity, operable to receive an input;

only one second movable permanent magnet having a magnetic pole of the first polarity and a magnetic pole of the second polarity spaced from said first permanent magnet and oriented such that the magnetic pole of the first polarity of said second permanent magnet is opposed to the magnetic pole of the first polarity of said first permanent magnet so as to exhibit a magnetic field between said first permanent magnet and said second permanent magnet; and

an overlap area changing device operable to change an overlapping area of said first and second permanent magnets so as to effect a change in magnetic energy of the magnetic field between said first and second permanent magnets;

wherein said second permanent magnet is operable to produce an output in response to both the input received by said first permanent magnet and the change in magnetic energy of the magnetic field between said first and second permanent magnets;

a driving device operable to apply a load to said first permanent magnet, so as to impart a potential energy onto said second permanent magnet, and oscillate said first permanent magnet at a balanced position with respect to said second permanent magnet; and

a flywheel coupled to said second permanent magnet;

wherein each of said first and second permanent magnets is disc-shaped and has an eccentric round hole defined therein, and said second permanent magnet is operable to rotate continuously via a force acting on said second permanent magnet tending to return said second permanent magnet to a position where a potential energy of said second permanent magnet is minimum, via a kinetic energy of the magnetic field between said first permanent magnet and said second permanent magnet, and via an inertial moment of said flywheel.

4. A magnet-spring apparatus as claimed in claim 3, wherein said first permanent magnet is operable to be slid by the input.

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