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ELECTRO-MAGNETIC VIBRATOR MOTORS

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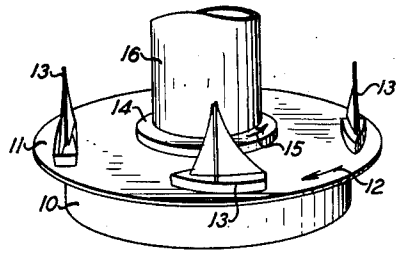


Fig. 1

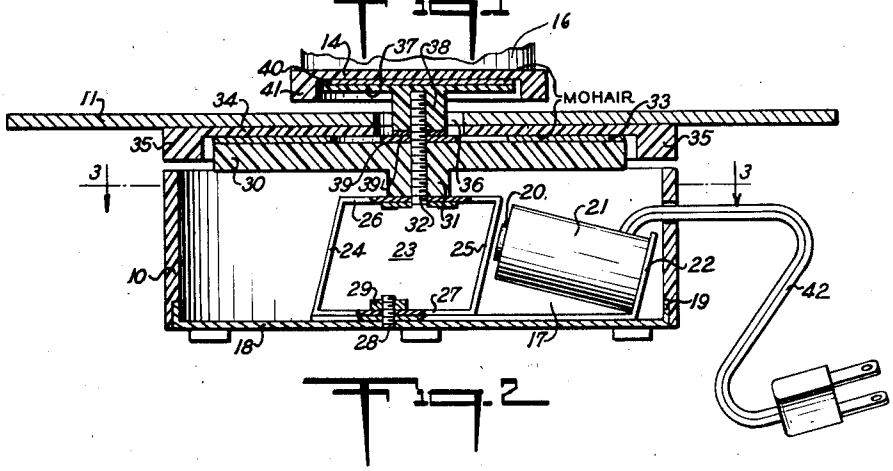


Fig. 2

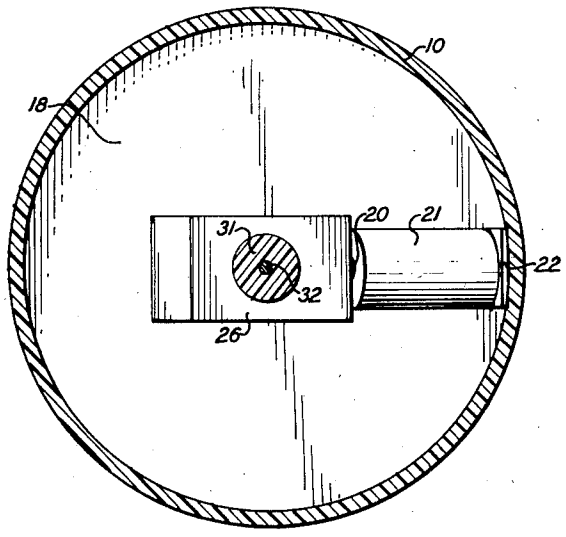


Fig. 3

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ELECTRO-MAGNETIC VIBRATOR MOTORS

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9 Claims. (Cl. 310—20)

This invention relates to electro-magnetic motors of the type in which a flexible or spring armature supporting a plate is electromagnetically vibrated to impart vibrating movements to said plate which are converted into rotating movements of a platform resting on this plate.

An important object of the present invention is to provide a plurality of these plates and associated platforms with a single electro-magnetic vibrating motor of the type mentioned.

Another important object of the invention is to provide a plurality of these plates and associated platforms concentrically on one armature of a single electro-magnetic motor of the above type.

A further object of the invention is to provide these plates and platforms in such a manner that each of the platforms rotates at a speed which is different from that of the others.

A still further object of the present invention is to provide these plates and platforms in such a manner that the latter rotate in different directions.

Other important objects and advantageous features of this invention will be apparent from the following detailed description and drawing appended thereto, wherein merely for purposes of disclosure herein, a non-limitative embodiment of this invention is set forth.

In the drawings,

Fig. 1 is a perspective view of a toy or display apparatus driven by a motor according to this invention;

Fig. 2 shows a longitudinal section through the motor in Fig. 1;

Fig. 3 represents a cross section through the motor in Fig. 2 taken along the lines 3—3 and looking in the direction of the arrows.

Referring in detail to Fig. 1 of the drawing, the driving motor itself is not visible in this illustration, because it is completely encased in a cylindrical box or jacket **10**. The top of the device in Fig. 1 is a round platform **11** extending over the cylindrical jacket **10**, said platform **11** being adapted to be rotated, for example, in the direction of arrow **12** by a driving motor inside the jacket **10**. Any kind of small articles to be displayed can be attached to the platform **11**. In Fig. 1, four small toy sail boats **13** are cemented on the platform **11** and are arranged close to the periphery thereof at equal distances from one another. A smaller round platform **14** rotating in a direction opposite to that of the larger platform **11**, for example, in the direction of arrow **15**, is concentrically arranged with respect to said larger platform **11**. Any suitable article to be displayed can be placed on the small platform **14**, for example, a can **16** to contain or simulate to contain the article to be advertised in a store window. Thus, in the embodiment shown in Fig. 1 the toy sail boats **13** appear to move in opposite direction of the rotation of the can **16**.

As Figs. 2 and 3 show, a vibrating motor **17** is mounted on a flat bottom **18** of the cylindrical casing **10**, said bottom being firmly secured to the latter, for example, by welding or soldering its outer flange or rim **19** to the

lower part of the cylindrical casing **10**. The vibrating motor **17** comprises an electromagnet having an iron core **20** on which an energizing coil **21** is wound. The iron core **20** and the energizing coil **21** are mounted on the bottom **18** by means of an angularly bent bracket iron **22** which is secured to the iron core **20**. The bending angle of the iron bracket is such that the axis of the electromagnet core **20** is inclined with respect to the surface of the bottom **18**. The electric conductors supplying current to the energizing coil **21** are denoted by **42**. An armature iron frame member **23** in the shape of a parallelogram with two slanting smaller parallel side strips **24**, **25** and two parallel horizontal strips **26**, **27** is mounted on the bottom **18**, i. e. the lower **27** of the horizontal strips together with the bracket **22** is secured to the bottom **18** by means of a single bolt **28** attached to the bottom **18** and a nut **29** threaded on this bolt **28**. The frame **23** is somewhat resilient due to its shape, structure and mounting i. e. it can be slightly deformed when vibrated under the action of the electromagnet. One of the inclined side strips of the frame **23**, i. e. side strip **25**, is arranged opposite the free end or pole shoe of the iron core **20** of the electromagnet in such a manner that a small gap remains between the end of the iron core **20** and the side strip **25**. The side strips **24**, **25** are slanting at such angle that the axis of the electromagnet core **20** is about perpendicular to the plane of the side strips **24** and **25** as shown in Fig. 2.

A round plate **30** having a central lug or boss **31** extending from the center of the bottom surface of the plate **30** is mounted on the upper horizontal strip **26** by means of a bolt **32** secured to this strip **26**, for example, by soldering, welding or brazing and extending upwardly therethrough. This bolt **32** is passed through a central opening in the round plate **30** and in its boss or lug **31** and the bottom of the latter is in seating engagement with the strip **26**. An annular portion of the upper surface of the plate **30** is covered with a layer **33** of a pile fabric, such as velvet or mohair, the pile of which is inclined in a given direction. This fabric may be cemented on the plate **30**. The center of the plate **30** is left free from the fabric. A flat bottom member **34** of the platform **11** secured thereto and having a depending peripheral flange **35** is resting on the pile fabric **33** of the platform **30**.

When the coil **21** of the electromagnet of the motor **17** is energized by a pulsating current, such as an alternating current, the side strip **25** will be intermittently attracted by the iron core **20**, whereby the armature frame member **23** of which the strip **25** is a part will vibrate in accordance with the frequency of this pulsating or alternating current. The member **34** with the platform **11** and the toy sail boats **13** mounted thereon will now rotate at a relative low velocity in the direction of the inclined hairs of the pile fabric **33**, because the individual hairs of the pile fabric **33** impart propelling impulses to the member **34** engaged thereby as a result of the vibrations transmitted to the plate **30** and this pile fabric **33**. In other words, the vibrations produced by the motor **17** are converted into rotational forces acting on the plaftorm **11** by the coaction between the pile fabric **33** and the contacted lower surface of the member **34**.

The platform **11** and its bottom member **34** are provided with relatively large central openings at **36** vertically perforating these two parts. A round plate **37** smaller than the plate **30** and having also a lug or boss **38** extending from the center of the bottom surface of the plate **37** is mounted on top of the plate **30**, i. e. the lug or boss **38** is threaded as a nut on the upper end of the bolt **32** extending through the plate **30** in which it is threaded and through the opening **36**. One or more washers **39**, **39'** of the required thickness for properly spacing the plate **37** above the platform **11** may be inserted

between the lower end of the lug or boss **38** and the upper surface of the plate **30**. The lug or boss **38** extends partially in the opening at **36** without engaging the wall of this opening. The plate **37** is covered by a layer **40** of pile fabric, such as velvet or mohair, cemented thereon. The hairs of this pile fabric are directed in opopsite direction as those of the pile fabric **33** on plate **30**. The small platform **14** supporting the can **16** is resting on the pile fabric **40** of the plate **37**. This small platform **14** having a peripheral depending flange **41** may be firmly secured to or joined with the bottom of the can **16**.

When the coil **21** of the vibrating motor **17** is energized, in addition to the platform **11**, the smaller platform **14** will rotate, whereby the direction of the rotation of the latter takes place in opposite direction to that of the platform **14**. If the hairs of the pile fabric **40** are inclined in the same direction as those of the pile fabric **33**, the rotating direction of the platform **14** will be reversed. Thus, it is possible to obtain a rotation of the smaller platform **14** either in the same or in opposite direction of that of the larger platform **11**.

The new motor can be constructed that the rotating speeds of the two revolving platforms are either the same or different from one another. The relative speeds of the platforms **11** and **14** depend upon the frequencies of vibration of their supporting and propelling fabric-covered plates **30** and **37**, the weight of the rotating members and the diameters of the platforms. A platform having a smaller diameter rotates faster than a platform with a large diameter. By suitably dimensioning or designing the elements or parts of the new motor, the speeds of the platforms can be varied or adjusted within certain limits. The frequency of vibration of the vibrating motor **17** and thereby its propelling speed can be varied or controlled by changing the width of the gap between the poles of the electromagnet and/or by decreasing or increasing the voltage fed to its energizing coil **21**.

It will be evident to those skilled in the arts that other structural arrangements and combinations thereof can be employed or devised to embody the invention disclosed herein, and that it is intended that the present invention include all such, without limitation to the specific forms thereof herein set forth.

I claim:

1. In a vibrator motor, a relatively stationary base, an electromagnetic vibrator on said base having an armature means and adjacent thereto an electro-magnet means adapted to be energized by an electric pulsating current to vibrate said armature means, a plurality of substantially horizontal plates concentrically arranged with respect to one another and connected to said armature means to be vibrated thereby, pile fabric layers on each of said plates, a platform adapted to support articles resting on each of said pile fabric layers to be rotated thereby under the action of the vibrations transmitted to said layers, said vibrations being converted into rotating movements of said platforms.

2. In a vibrator motor according to claim 1, wherein the piles of said fabric layers on said different plates are inclined in different directions.

3. In a vibrator motor according to claim 1, wherein the piles of said fabric layers on said different plates are inclined in the same direction.

4. In a vibrator motor according to claim 1, wherein said armature means comprises a flexible frame having the shape of a parallelogram formed by two substantially horizontal strips and two slanting side strips between said horizontal strips, one of said side strips being opposite said electro-magnet means, the upper of said substantially horizontal strips supporting said plates, the lower of said horizontal strips being attached to said base.

5. In a vibrator motor according to claim 1, wherein one of said plates is directly mounted on said armature means and at least one of the other of said plates is secured to said first plate.

6. In a vibrator motor according to claim 1, wherein said plates are round disks, wherein one of said plates is directly mounted on said armature means, and wherein said platforms are also round disks.

7. In a vibrator motor according to claim 1, wherein said plates and said platforms are disposed at different levels, respectively.

8. In a vibrator motor according to claim 7, wherein at least one of said platforms has a central opening, and wherein at least one of said plates has a central lug at its bottom extending into said central opening to engage said plate underneath thereof on which it is mounted.

9. In a vibrator motor according to claim 8, wherein a single bolt is mounted on said armature means, said bolt projecting substantially vertically, said plates being secured to said bolt.

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