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(54) FURNITURE ELEMENT COMPRISING A MAGNETIC LAZY SUSAN

MÖBELELEMENT MIT EINEM MAGNETISCHEN DREHTISCH

ÉLEMENT DE MEUBLE ÉQUIPÉ D'UN CARROUSEL MAGNÉTIQUE

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EP 2 802 238 B1

Description

BACKGROUND OF THE INVENTION

[0001] The proposed invention is in the technical field of furniture.

[0002] More specifically, the present invention is in the technical field of dining tables.

[0003] More specifically, the present invention is in the technical field of lazy-susan systems for dining tables.

[0004] WO-A1-2009/038464 discloses a levitation device having a suspended carrier incorporating permanent magnets.

[0005] JP355066324 discloses a table according to the preamble of claim 1.

SUMMARY OF THE INVENTION

[0006] The proposed invention is a magnetic lazy-susan and a table with integrated trays placed on top of the table to aid in the moving food, floating and rotating thanks to a magnetic levitation system located underneath the tabletop.

[0007] Tables associated to lazy-susan systems represent a large part of the table market in China, Korea and Japan; most of them are round with a circular, rotating tray positioned in the centre.

[0008] The proposed invention suggests a different way to develop this kind of table, installing a magnetic levitation system underneath the tabletop.

[0009] Different configurations can be obtained: the lazy-susan can simply float, thanks to a magnetic levitation system; the configuration is the same of a traditional table system, but without having to make use of any mechanical connection between the rotating level and the table underneath.

[0010] In a second configuration, each dish is floating by itself on a single carrier, levitating thanks to the magnetic-levitation system. As one moves, the table automatically reconfigures all the others, following circular paths. This allows the use of tables of different shapes, not just circular ones.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a perspective view of the table system of the present invention - different shapes can be designed;

Fig. 2 is a section detail of the applicable magnetic levitation technology;

Fig. 3 is a section view of the proposed invention;

Fig. 4 is a functional diagram of the applicable Linear DC motor technology;

Fig.5 is an illustration of how the system allows for tables of shapes other than circular ones.

DETAILED DESCRIPTION OF THE INVENTION

[0012] Referring now to the invention in more detail, a table is shown in Fig. 1 where, inserting a magnetic levitation system underneath the tabletop, different trays can move on the table surface following pre-set paths, suspended a few centimeters above the table by magnetic forces. This is possible thanks to the combination of a standard levitating technological system, already currently available, with a Linear DC motor, which determines the movement, under the tabletop and, consequently, the movement of the table objects above. In particular, the linear DC motor generates a moving magnetic field that can be controlled so as to drive the motion of the trays.

[0013] The invention advances, and could substitute, the traditional lazy-susan system, allowing the easy movement of plates around the table.

[0014] Referring now to applied technologies in more detail, we can see a standard levitating technological system in Fig. 2, which is currently available on the market.

[0015] The system is composed of a base (non floating-part) consisting of a copper or iron block (2), a permanent magnet base (3), and an oscillating field generator (4), and a floating-part consisting of a magnet ring - a carrier (1) - constantly rotating at a slow speed, and suspended a few centimeters above from the base.

[0016] This system permits the levitation of the carrier, thanks to the connection of the base to an electrical power source, which allows the creation of a magnetic field. In fact both carrier and base contain powerful magnets. Also permanent magnets alone can be used to suspend carrier 1 and the electrical power source controls a stabilizer, preferably an electromagnetic stabilizer. Once the carrier is placed in the middle of the base, it can be left alone: the magnetic field permits the self-levitation of the object.

[0017] The systems currently on the market allows for a maximum levitation of 44 mm with a device of the following dimensions: base with a height of 15 mm and width and length of 202 mm;
floating disc (carrier) with a height of 13 mm and diameter of 124 mm. The systems available on the market are able to carry loads of up to 1 kg.

[0018] Of relevance to the invention and particularly the carrier(s) of the objects on the table, is the following. A single carrier applied to a table object, due the nature of the system, is found to constantly rotate slowly on itself about a vertical axis. The application of two levitation systems (for example permanent magnets of base and carrier respectively) on a single table object constrains the object not to rotate, levitating motionlessly, thanks to the equilibrium between the two magnetic fields and gravity applied to the carrier.

[0019] The schematic section, represented in Fig. 3, shows the integration of the different elements:

below the tabletop (6) we can find the base of the levitation system: the copper or iron block, the per-

manent magnet base and the oscillating field generator. These elements are inserted into an enclosed compartment of the table (7) creating a magnetic force (5) that supports the carrier (1).

[0020] On top of the table, the carrier (1) starts floating when the magnetic field is on. At this point the carrier(s) can be used to move the plates and other objects on the table. As a mere example, a levitation system according to the above is disclosed in WO-A1-2009038464.

[0021] Combining the levitating technology to a Linear DC motor or another electromagnetic drive coupled with the magnets of carrier 1, as shown in Fig.4, we can create a sliding movement or a translation in the carrier(s) above base (3). A linear motor produces motion directly in a straight line or in different paths depending on the layout of the magnets defining the stator of the linear motor: applying this existing technology to the levitation system allows movement of the carrier(s) in a linear manner. In a further embodiment, the base stands still and the electromagnetic drive generates a moving electromagnetic field, either a rotating electromagnetic field or a translating electromagnetic field.

[0022] This movement allows the creation of a specific orbit on which, over the tabletop, the carrier(s) (the second magnet) can float.

[0023] The Linear DC motor works as a track for the carrier(s). In fact, like a rotating motor, the stator (11) of the linear motor creates a magnetic shear wave (10), which moves the field and the carrier(s) accordingly. In Fig. 4 the directions of movement of the electromagnetic wave (8), the stator (11), the runner magnet (12) and the sharing force (9) are shown.

[0024] In further detail, and still referring to Fig. 3, the applied technological components can be sufficiently minimized to be inserted into a compartment the thickness of a standard tabletop (with minimum thickness of 4 cm) therefore creating a hidden system. The tabletop may be made with any material, but metal.

[0025] The shape and dimension of the table can be freely designed: the tabletop does not need necessarily be circular, just comfortable enough to allow space for the magnetic carrier(s) to move on the table following the set track (as shown in Fig.1 and Fig.5). In Fig. 5 the possibilities for applying the system, composed of the Linear DC motor and the levitating technology, are shown with tables of different shapes: the floating systems occupy the centre of the table with their individual orbits. The tracks (13), determined by the Linear DC motor, can be programmed to different shapes, preferably non-circular, according to the tabletop shape (6) contrary to that of a traditional lazy-susan that must be circular and cannot be made to fit other shapes.

[0026] In order to stabilize the lateral position and to avoid excessive tilting of the carrier with respect to base (3) a dedicated electromagnetic field is generated and controlled by control unit (15) processing in closed loop a signal from position sensor 16 detecting the position of the carrier 1.

[0027] Other lateral stabilizing techniques not according to the invention, comprise permanent magnet side tracks for the carrier or plurality of carriers aligned along the path defined by the stator of the linear DC motor. The side tracks stabilize the lateral position of the carrier.

[0028] Furthermore, a lateral stabilizer not according to the invention, may comprise a mechanical contact guide.

[0029] In the description and the claims, a magnet can be either and electromagnet comprising one or more coils or a permanent magnet. Furthermore, electromagnetic coils controlled by a control unit comprising an inverter define an electromagnetic drive.

Claims

1. Furniture element (7) having a top wall (6) and a Lazy Susan unit comprising a magnetic base (3) and at least one permanent magnet carrier (1) levitating by repulsion with respect to said magnet base (3), wherein said magnetic base (3) is housed within said top wall (6), **characterized by** comprising a magnetic guide (4) to stabilize the lateral position of said carrier (1) in a substantially horizontal plane; wherein the guide (4) comprises at least an electromagnetic coil, at least one position sensor (16) to detect the position of the carrier (1) and a control unit (15) controlling said electromagnet to stabilize at least the lateral position of said carrier (1) based on the input of said at least one position sensor (16); and wherein said magnetic base (3) is hidden inside said top wall (6).

2. The furniture element according to claim 1, wherein at least said magnetic base (3) comprises coils to define a preset non-circular path along which said carrier (1) translates.

3. The furniture element according to any of the preceding claims, comprising an electromagnetic drive (11, 12) to move said carrier (1) above said magnetic base (3).

4. The furniture element according to claims 5, wherein said drive (11, 12) is the stator of a linear motor and said carrier (1) translates above said base (3).

5. The furniture element according to any of claims 3 or 4, wherein said drive (11, 12) is such to move a dish placed on said carrier (1) at no more than 0.3 m/s.

6. The furniture element according to any of the preceding claims, comprising a mechanical or magnetic stabilizer to stabilize said carrier with respect to tilting, in particular to avoid food spillage or drop.

7. The furniture element according to any of the preceding claims, wherein the levitation of said carrier (1) is from 10 to 30 mm, dependently from the load on said carrier (1).

8. The furniture element according to any of the preceding claims wherein said carrier (1) can sustain up to 1.5 kg.

9. The furniture element according to any of the preceding claims wherein said base (3) comprises a permanent magnet to sustain the levitation of said carrier (1).

10. The furniture element (7) according to claim 9, comprising a table and wherein said top wall (6) is the tabletop of said table.

Patentansprüche

1. Möbelelement (7) mit einer oberen Wand (6) und einer Drehtischeinheit, die eine magnetische Basis (3) und wenigstens einen permanentmagnetischen Träger (1) aufweist, der durch Abstoßung von der magnetischen Basis (3) schwebt, wobei die magnetische Basis (3) in der oberen Wand (6) eingefasst ist, **gekennzeichnet durch** eine magnetische Führung (4) zum Stabilisieren der lateralen Position und des Trägers (1) in einer im Westlichen horizontalen Ebene, wobei die Führung (4) wenigstens eine elektromagnetische Spule, wenigstens einen Lagesensor (16) zum Detektieren der Position des Trägers (1) und eine Steuereinheit (15) aufweist, die einen Elektronmagneten steuert, um zumindest die laterale Position des Trägers (1) auf der Basis von Eingaben des wenigstens einen Lagesensors (16) zu stabilisieren, und wobei die magnetische Basis (3) in der oberen Wand (6) verborgen ist.

2. Möbelelement nach Anspruch 1, wobei die wenigstens eine magnetische Basis (3) Spulen enthält, um einen vorgegebenen nicht-kreisförmigen Weg zu definieren, entlang welchem sich der Träger (1) bewegt.

3. Möbelelement nach einem der vorstehenden Ansprüche, mit einem elektromagnetischem Antrieb (11, 12), um den Träger (1) über der magnetischen Basis (3) zu bewegen.

4. Möbelelement nach Anspruch 5, wobei der Antrieb (11, 12,) der Stator eines Linearmotors ist und der Träger (1) über der Basis (3) verschoben wird.

5. Möbelelement nach einem der Ansprüche 3 oder 4, wobei der Antrieb (11, 12) dafür ausgelegt ist, ein auf dem Träger (1) platziertes Gedeck mit nicht mehr als 0,3 m pro Sekunde zu bewegen.

6. Möbelelement nach einem der vorstehenden Ansprüche, mit einem mechanischen oder magnetischen Stabilisator, um den Träger in Bezug auf Kippbewegungen zu stabilisieren, insbesondere um Verschütten oder Herunterfallen von Speißen zu verhindern.

7. Möbelelement nach einem der vorstehenden Ansprüche, wobei das Schweben des Trägers (1) zwischen 10 und 30 mm hoch ist, abhängig von der Belastung des Trägers (1).

8. Möbelelement nach einem der vorstehenden Ansprüche, wobei der Träger (1) bis zu 1,5 kg tragen kann.

9. Möbelelement nach einem der vorstehenden Ansprüche, wobei die Basis (3) einen Permanentmagneten enthält, um das Schweben des Trägers (1) aufrecht zu erhalten.

10. Möbelelement (7) nach Anspruch 9, mit einem Tisch, wobei die obere Wand (6) die Oberfläche des Tischs bildet.

Revendications

1. Élément de meuble (7) ayant une paroi supérieure (6) et une unité de carrousel comprenant une base magnétique (3) et au moins un support d'aimant permanent (1) en lévitation par répulsion par rapport à ladite base magnétique (3), ladite base magnétique (3) étant reçue à l'intérieur de ladite paroi supérieure (6), **caractérisé par** le fait de comprendre un guide magnétique (4) pour stabiliser la position latérale dudit support (1) dans un plan sensiblement horizontal ; le guide (4) comprenant au moins une bobine électromagnétique, au moins un capteur de position (16) pour détecter la position du support (1), et une unité de commande (15) commandant ledit électroaimant pour stabiliser au moins la position latérale dudit support (1) sur la base de l'entrée dudit au moins un capteur de position (16) ; et ladite base magnétique (3) étant dissimulée à l'intérieur de ladite paroi supérieure (6).

2. Élément de meuble selon la revendication 1, dans lequel au moins ladite base magnétique (3) comprend des bobines pour définir un trajet non-circulaire prédéfini le long duquel ledit support (1) se déplace en translation.

3. Élément de meuble selon l'une quelconque des revendications précédentes, comprenant un entraînement électromagnétique (11, 12) pour déplacer ledit

support (1) au-dessus de ladite base magnétique (3).

4. Élément de meuble selon la revendication 3, dans lequel ledit entraînement (11, 12) est le stator d'un moteur linéaire et ledit support (1) se déplace en translation au-dessus de ladite base (3).

5. Élément de meuble selon l'une quelconque des revendications 3 ou 4, dans lequel ledit entraînement (11, 12) est tel qu'il délace un plat disposé sur ledit support (1) à pas plus de 0,3 m/s.

6. Élément de meuble selon l'une quelconque des revendications précédentes, comprenant un stabilisateur mécanique ou magnétique pour stabiliser ledit support par rapport à une inclinaison, en particulier pour éviter une chute ou un renversement d'aliment.

7. Élément de meuble selon l'une quelconque des revendications précédentes, dans lequel la lévitation dudit support (1) est comprise entre 10 et 30 mm, indépendamment de la charge sur ledit support (1).

8. Élément de meuble selon l'une quelconque des revendications précédentes, dans lequel ledit support (1) peut soutenir jusqu'à 1,5 kg.

9. Élément de meuble selon l'une quelconque des revendications précédentes, dans lequel ladite base (3) comprend un aimant permanent pour soutenir la lévitation dudit support (1).

10. Élément de meuble (7) selon la revendication 9, comprenant une table, et ladite paroi supérieure (6) étant le dessus de table de ladite table.

FIG. 1

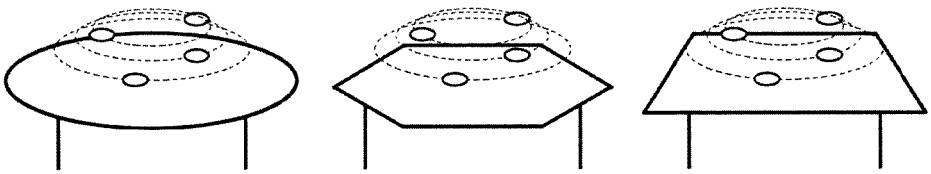


FIG. 2

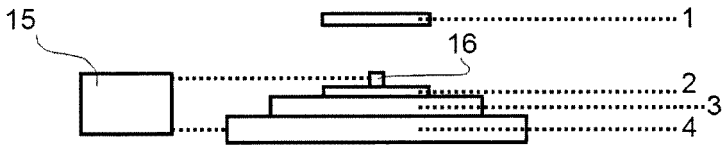


FIG. 3

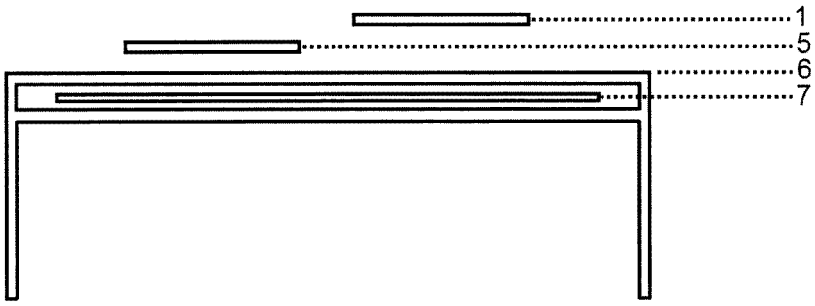


FIG. 4

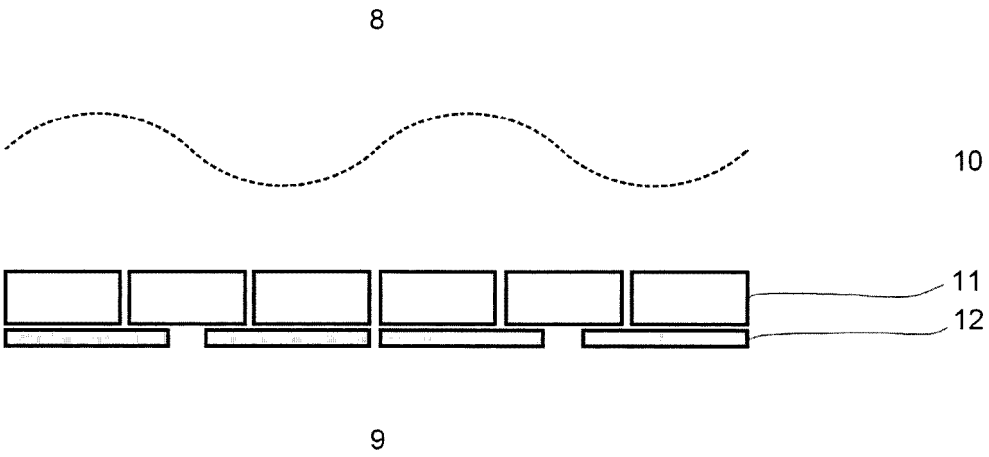
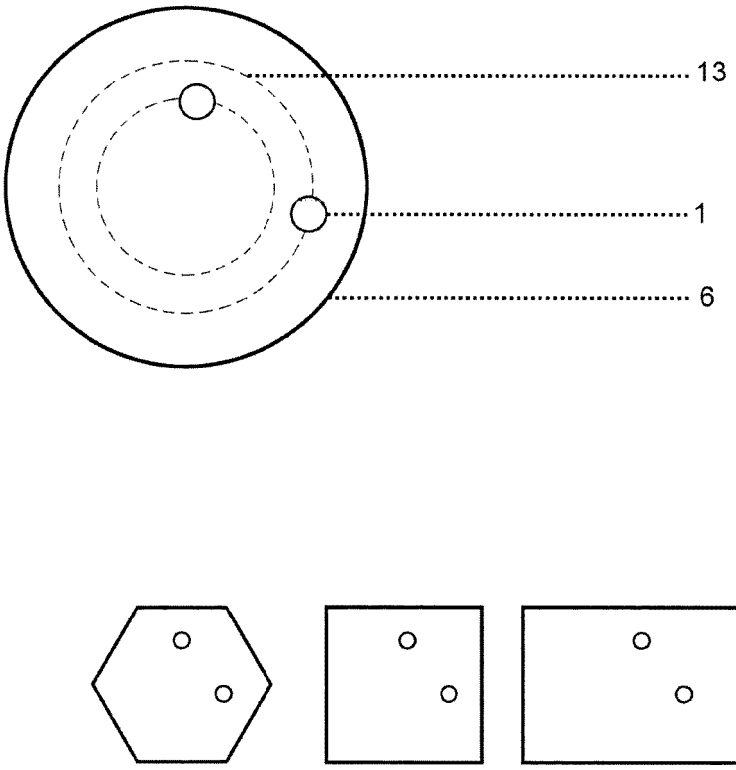


FIG. 5



REFERENCES CITED IN THE DESCRIPTION

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