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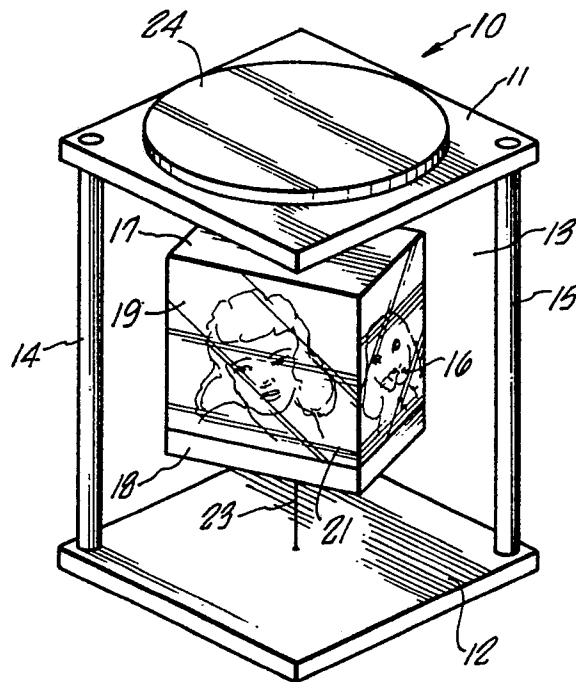
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54 **Magnetically supported display.**

57 A display device having a base defining a display area between the opposite surfaces of a pair of plates in which a display member is magnetically supported on a filament extending between one plate and the member, and in which a first magnet is mounted on the other plate. Magnetic material or a second magnet is carried on the member in attractive relationship to the first magnet so that the member is magnetically suspended in the display area pulling taut against the filament. Articles to be displayed such as photos or the like are mounted for visual observation on the member.



**FIG. 1**

**EP 0 370 592 A2**

## MAGNETICALLY SUPPORTED DISPLAY

The present invention relates to display devices and more particularly to a novel means for displaying an object so as to appear in a suspended or floating position.

It has been the conventional practice to display articles such as photographs or the like in frames that are two-dimensional and that are supported by pivot means to bases or mounts so that the holder appears to be static or rigidly positioned. In such devices, a rigid frame, including glass, serves to hold a photograph, as an example, and the frame is either supported from the rear by a leg or stanchion, or the sides of the frame are connected to a base that supports the frame in a fixed position.

Although such prior frame holders and photo holders have been useful for their intended purpose, the ornamental or decorative appearance and presentation of the photographic material is unimaginative and rigid. Also, such prior frames or holders are adapted to support a single photograph or perhaps a multiple of photographs but in the same plane. That is to say, multiple photographs can be shown on a flat surface when viewed from a single direction.

Therefore, a long standing need has existed to provide a novel means for presenting an article to be displayed so that the viewer's imagination is stimulated and so that multiple objects can be displayed simultaneously in different planes of view. Such a means controllably supports the objects in a floating or suspended position which creates an interesting and stimulating environment for portrayal of the objects being displayed.

Accordingly, the above problems and difficulties are obviated by the present invention which provides a novel display means comprising a base means having end plates with a display area defined between the opposing surfaces of the plates. The uppermost plate mounts a fixed magnet and a second magnet or magnetic material is placed on a display positionable within the display area. A filament couples the other plate to the underside of the display and a magnetic coupling occurs between the pair of magnets and magnetic material so that attraction occurs for suspending the holder immediately under the plate in spaced relationship so that the filament is drawn taut, giving the holder a floating or suspended visual impression.

The display is preferably a holder characterized as having means for selectively supporting a single or a plurality of articles such as photographs intended to be displayed within the area defined.

Therefore, it is among the primary objects of the present invention to provide a novel display means having a display area magnetically support-

ing a display holder for enclosing articles to be visually presented and viewed.

According to another aspect of the present invention, the novel display means provides for displaying selectively a variety of articles so that the display appears to be in a floating or suspended position within a display area defined on a base mounting means. The article includes a magnet for interacting under attractive force with a magnet located fixedly above the article. The article is held by a flexible filament with the base mounting means so that the filament is drawn taut under the magnetic action. Horizontal twisting of the article in one direction about a position of rest causes the filament to return the article in a counteraction to a position of stability after progressively horizontally oscillating about the position of rest.

According to another aspect of the invention the novel display provides for magnetically supporting a holder for articles so that the articles appear to be floating or suspended within a display area between mounting plates, the articles occupying a substantial portion of the display area between the plates. The substantial portion of the display area being occupied is at least laterally or vertically related to the mounting plates.

In a preferred form of the invention the display is at least partly reflective, and the mass or volume of the display is sufficient to cause relatively long term movement. After having been set to oscillation. The mass is arranged to generate oscillations in the non-horizontal plane. By balancing the magnetic attraction forces against the filament there is a relative weightlessness of the article. Accordingly, prolonged oscillation in the horizontal plane can be effected.

In a further preferred form of the invention the magnets in the top of the display and in the article are selectively ring or disc magnets. The magnetics provide a symmetrical magnetic field thereby facilitating regular oscillations of the articles in the horizontal plane. The magnetics are preferably sufficiently strong to achieve substantial spacing from the top plate.

The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood with reference to the following description, taken in connection with the accompanying drawings in which:

FIGURE 1 is a front perspective view showing the novel display apparatus of the present invention magnetically suspending an article to be displayed;

FIGURE 2 is a front exploded perspective

view showing the mounting means for suspending the holder enclosing the article to be presented; and

FIGURE 3 is an exploded perspective view showing the holder for the article or articles to be displayed in a floating or suspended position.

FIGURE 4 is a perspective view of an alternative construction for the display with a ring magnet for location inside the top of the holder, and a plug for location at the bottom of the base to secure the filament to the base.

Referring to FIGURE 1, the novel display of the present invention is shown in the general direction of arrow 10 which includes an upper plate 11 and a lower plate 12 defining a display area between their opposite and opposing surfaces wherein the display area is generally represented by the numeral 13. The plates 11 and 12 are joined together by suitable means, such as posts 14 and 15, which are arranged to interconnect marginal regions of the respective plates. It is understood that a single mounting member can interconnect the plates along common edges in place of the posts, if desired.

Suspended within the display area 13, there is provided a display or holder 16 which is composed of transparent material so that an article to be displayed can be visually viewed through the holder composition.

The material also has an at least partly reflective characteristic. In the present illustration, the holder 16 comprises a cube which is indicated by numeral 17 into which a foam block is carried on a retainer 18. The foam block is illustrated in general by the number 19. In the present illustration, the article to be displayed is a photograph, such as indicated by number 21, behind the wall of the cube holder 17. Therefore, the photograph which is flat is positioned between the outer surface of one side of block 19 and the inner surface of the wall comprising the cube 17. The retainer 18 not only holds the block in position but holds the photo or photograph in position around the cube.

The mass and volume of the object 16 is selected to provide the effectively desired oscillations horizontally when the object 16 is set in motion. The effective weightlessness of object 16 can, if desired, permit the object 16 to oscillate extensively in a horizontal plane.

A filament 23 is connected at one end to the plate 12 and at its other end to the underside of the retainer 18. A first magnetic means is carried on the upper plate 11 and cooperates with a second magnetic means carried on the cube holder 17 so that a magnetic coupling occurs in attraction so that the holder is drawn upwardly toward the top plate 11. Resistance to the attractive force is experienced when the holder draws filament 23 taut.

Therefore, the resultant effect is that the cube holder 17 is in a suspended appearing condition and appears to float within the display area 13. A cover 24 is employed on the top plate 11 which covers the magnetic means on the plate. In some cases the cover 24 can be eliminated and the top plate is flat. The magnetic means 26 is affixed with an adhesive to the bottom of the top plate 11. This provides for a smooth top face to the top plate 11.

Referring now in detail to FIGURE 2, the base or mount for defining the display area is illustrated and it can be seen that the plates 11 and 12 are arranged in fixed spaced-apart relationship by the mounting posts 14 and 15 respectively. Also, the upper plate 11 includes a circular cutout or cavity 25 for insertably receiving a ring or disc magnet 26 therein. Once so positioned, the cover 24 is placed against the upper exposed surface of the plate 11 so that the magnet 26 is covered and out of view. Preferably, the ring or disc magnet 26 is composed of a ceramic material. By using a disc magnet 26 the distance between the top of cube holder 17 from the plate 11 can be increased relative to a comparable ring magnet.

Referring now in detail to FIGURE 3, the holder for the object to be displayed is illustrated in exploded form whereas it can be seen that the cube 17 is of a transparent plastic material so as to be light in weight, and further includes a snap-lock portion 26 on its lower side adapted to mate with a groove 27 within the retainer 18. The block 19 is composed of a lightweight cellular foam material and includes a slot or groove 28 for holding ferro-magnetic material or a second magnet, which is identified by numeral 30. A covering sheet 31 is placed over the top of the block and the ferro-magnetic material or the second magnet.

The photograph is illustrated by numeral 21 which is disposed against the inside of a transparent wall of the holder or housing 17. The retainer 18 holds the assembly of the block, magnet or ferro-magnetic material, cover sheet and the transparent case or housing 17 together in an integral unit and includes the articles to be displayed as well. A tape 32 secures an end of the filament 23 to the underside of base 12 at one end and a similar tape or other adhesive or connection means couples the opposite end of the filament to the underside of the retainer 18. Therefore, the object to be displayed within the holder 17 is anchored to the plate 12.

The magnet 30 is shown as a rectangular element in the drawings. In another embodiment illustrated in Figure 4, the magnet 30 is a disc, ring or cylinder 130. A disc is more efficient in effecting smooth motion of the cube holder 17 because of the symmetry with the magnet in the plate 11. It also permits for increased distance from plate 11.

When fully assembled, the operating principle of the invention is based on the laws of magnetism. The first magnet mounted above the object or holder is attracted to the second magnet or ferro-magnetic material. Using the attraction of opposite magnetic poles, the object or cube holder 17 can be made to appear weightless. With the string or filament 23 adjusted so that the object or holder stays within the magnetic field, the objects to be displayed will be within the display area for viewing. However, the object or holder will be floating in the air to give the appearance of an anti-gravity effect. The actual distance between the mounted magnet in the top plate 11 and the floating or suspended holder varies depending on the grade of magnets, weight of the holder or objects and the material used.

The filament 23 is a fine material which is of a transparent nature. The object 16 is sized to occupy a substantial portion of the display area, both vertically and horizontally. The size of the object 16 is sufficiently larger to essentially occupy at least about 30% of the display area between the plates. Also by sizing the object 16 approximately a substantial portion of the filament 23 is hidden from view by the object 16 when viewed from a normal viewing position at a table top level or an eye level position above the device. An object is to make filament as slightly visible as possible. The height of the object occupies about 50% of the height of the display area, and the filament length is about 25% and the space above the display object to the top plate occupies also about 25%.

It is also to be understood that the magnetic principle can be employed when utilizing a flat picture frame. In this instance, a pair of filaments is used at opposite ends of the flat frame and the second magnet or ferro-magnetic material is placed at the top of the frame immediately under the top supporting plate 11 so that magnetic attraction occurs between the magnets or magnetic material. Therefore, different anchoring means may be provided by employing a single filament, a double filament in spaced relationship, or multiple filaments, depending on the size, shape and weight of the article being displayed. Also, it is to be understood that the article to be displayed may be either a magnet or of ferro-magnetic material and as such, the underside of the article will be anchored by a string or filament to the bottom plate. In such an instance, the article becomes the holder in accordance with the principles of the present invention.

In another embodiment, instead of a tape 32, a plastic plug 132 can be used to effect the anchoring of the filament to the base of the plate 12. In Figure 4 a plug 132 is shown since this provides effective securing of the filament 23 into an ap-

erture 133 in the plate 12. The magnet 30 is located at the upper part 17 of the object 16 and securing of the object 17 with a filament 23 is at the bottom of the object. The object 16 is composed of two parts 17 and 18 which are separable to permit replacement of photos. Thus, by having the anchorage 32 in one of the components 17, the disassembly of the object 16 is facilitated. Thus, the magnet 30 is at the top encased in a separate component 17 relative to the anchorage 32 at the bottom.

Additionally, other ornamental features can be imparted to the device such as flattening or beveling of edges around the plate 11.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects. For instance, the magnet in the base can be positioned in the bottom plate and operate under repulsion forces with the magnet in the holder. There may also be several magnets in the device suitably arranged. The appended claims cover all such changes and modifications as fall within the true spirit and scope of this invention.

## Claims

A display device comprising:

- (a) a base having an open display area;
- (b) a display disposed in the display area in spaced relationship to the base; and
- (c) means carried on the base for supporting the display having an anchor securing the display to the base and first magnetic means carried by the base and cooperating with a second magnetic means of the display whereby magnetic forces hold the display within the display area against the anchor.

2. The display device as claimed in Claim 1 wherein the display includes means for replaceable holding an article, the article selectively being a photograph.

3. The display device as claimed in Claim 2 wherein the display includes a transparent cube surrounding a foam block and said article to be displayed is disposed between the block and the cube.

4. The display device as claimed in Claim 3 wherein the base includes a pair of plates held apart by supports and the opposing surfaces of the plates define the display area.

5. The display device as claimed in Claim 4 wherein the first magnetic means includes a magnet fixed on a selected plate and the second magnetic means is carried on the display in close

proximity to the base plate carrying the first magnetic.

6. The display device as claimed in Claim 5 wherein the anchor is a filament secured at its opposite ends to the plate being below the display, and to the display respectively.

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7. The display device as claimed in Claim 6 wherein the display includes a retaining means for releasably holding the cube, block and photograph together as a unitary construction.

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8. The display device as claimed in Claim 7 wherein the anchor is plug affixed to the retaining means, and the second magnet is at the end of the display remote from the retaining means.

9. A display device comprising:

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- (a) a base having an open display area;
- (b) a display including a holder disposed in the display area in spaced relationship to the base; and
- (c) means carried on the base for supporting the holder having an anchor securing one end of the holder to the base, and first magnetic means carried on the base and cooperating with a second magnetic means at the other end of the holder whereby magnetic attraction forces floats the holder within the display area against the anchor.

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10. The display device as claimed in any one of claims 1 to 9 wherein the first magnetic means and second magnetic means are ring or disc magnets.

11. The display device as claimed in any one of claims 1 to 10 wherein the display occupies at least about 30% of the display area.

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12. The display device as claimed in any one of claims 1 to 11 wherein the display area defines a height, and wherein the display occupies about 50% of the height and the anchor occupies about 25% of the height.

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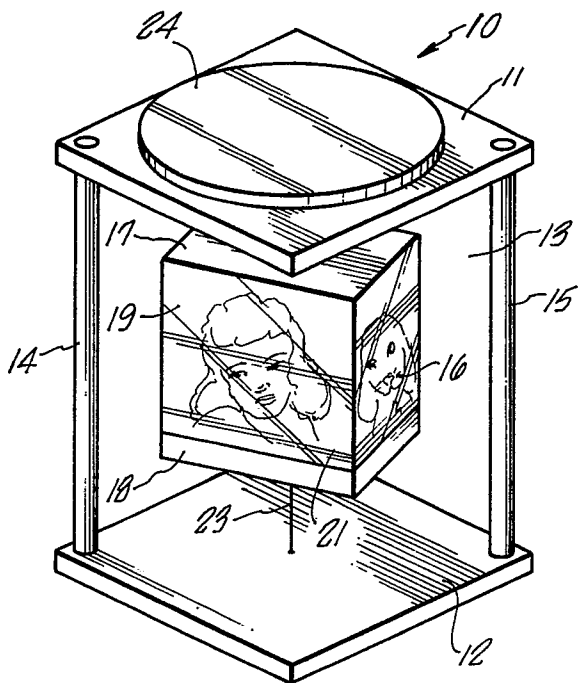


FIG. 1

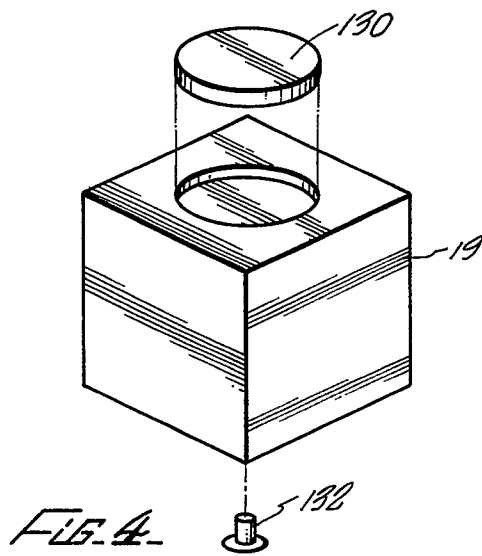


FIG. 4

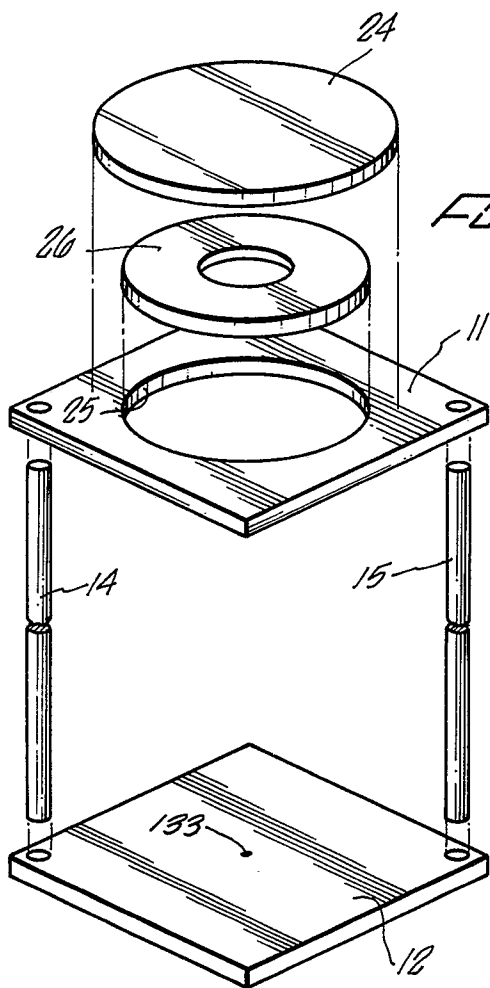


FIG. 2

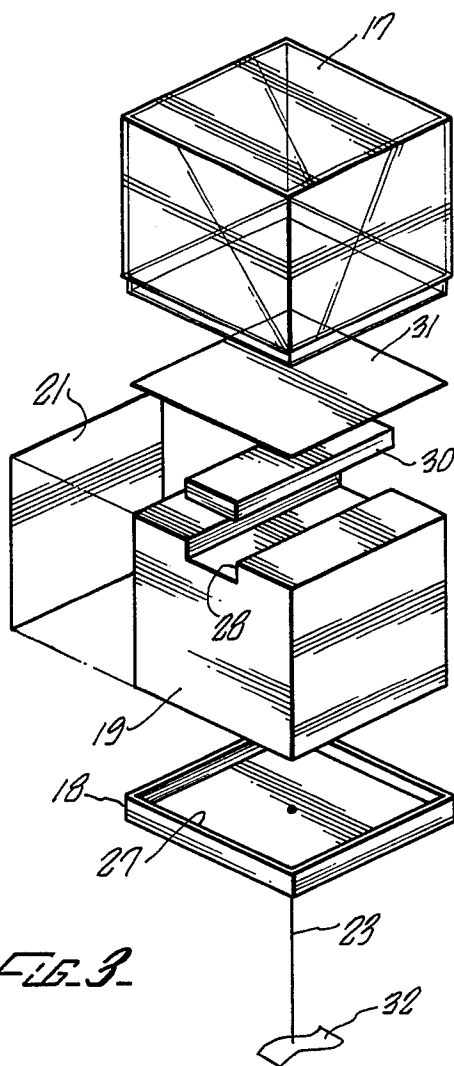


FIG. 3