

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 731 435 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
27.01.1999 Bulletin 1999/04

(51) Int Cl.⁶: **G09F 9/37**

(21) Application number: **95301528.6**

(22) Date of filing: **08.03.1995**

(54) **Magnetically operated display**

Magnetisch betriebene Anzeigevorrichtung

Dispositif d'affichage à commande magnétique

(84) Designated Contracting States:
DE ES FR GB IT SE

(43) Date of publication of application:
11.09.1996 Bulletin 1996/37

(73) Proprietor: **LITE VISION CORPORATION**
Taipei (TW)

(72) Inventor: **Kao, Pin Chi**
Hsintien City, Taipei Hsien (TW)

(74) Representative: **Pfeifer, Hans-Peter, Dr.,**
Dr. H.-P. Pfeifer Dr. P. Jany, Patentanwälte et al
Beiertheimer Allee 19
76137 Karlsruhe (DE)

(56) References cited:
EP-A- 0 401 980 EP-A- 0 463 725
EP-A- 0 556 954 WO-A-94/07231
DE-A- 3 916 283 US-A- 5 022 171

EP 0 731 435 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

This invention relates to a magnetically operated display.

Eye-catching displays are becoming more and more popular due to increasing consumerism and the desire for public awareness of products, public announcements etc.

A first conventional display includes a matrix of light emitting diodes (LEDs) wherein various groups of the LEDs in the matrix can be selectively turned on simultaneously to present various images. The first conventional display performs well in an environment with a low level of light. However, the efficiency of the first conventional display is considerably reduced if the level of light is increased, for example, a sunny day, and the noticeability of the display is impaired.

A second conventional display includes a matrix of magnetically operated display units each including a magnet embedded in a pivotable plate including a first surface with a color different from that of the remaining portion thereof and a second surface with a color identical to that of the remaining portion thereof. The second surfaces of different groups of the pivotable plates in the matrix are selectively exposed to view so as to show different images. The second conventional display shows clear images in a bright environment, however, visibility of the first surfaces of the pivotable plates is greatly reduced in the dark as the first surfaces of the plates do not produce light.

In order to overcome this problem it was proposed to provide the pivotable plate type magnetically operated display units with individual light sources arranged behind the plates in such a manner that the light shines through small cutouts in the plate. Such a device, in which the light sources are optical fibres, is shown in EP 0556954 A1. A similar design, but using a different type of flip-over drive for the plate, is disclosed in US-patent 5,022,171.

It is the primary objective of this invention to provide a magnetically operated display unit which presents clear images in the darkness or in bright sunlight.

This problem is solved by a magnetically operated display unit according to claim 1.

In the drawings:

FIG. 1 is a perspective view of a magnetically operated display.

FIG. 1 shows a magnetically operated display unit 2 including a frame 4 including a base 6 defining five apertures (not shown). Two ferromagnetic rods 8, two ferromagnetic pins 10 and a light emitting diode (LED) 12 are correspondingly inserted through the apertures defined in the base 6. Each of the ferromagnetic rods 8 includes a lower tip and an upper tip. The LED 12 includes two leads 13. A wire 14 is sequentially wound around the ferromagnetic rods 8 so that a solenoid 16 is formed on each of the ferromagnetic rods 8. The wire 14 includes two ends each soldered to a corresponding

one of the ferromagnetic pins 10. The lower tips of the ferromagnetic rods 8 are linked to each other by means of a ferromagnetic strip 17 so that the ferromagnetic rods 8 and the ferromagnetic strip 17 form a U-shaped ferromagnetic element. Each of the ferromagnetic pins 10 can be inserted into a socket (not shown) so that the magnetically operated display unit can be connected with a circuit 18. The LED 12 is also connected with the circuit 18.

Two arms 20 project upwardly from the frame 4. Two fingers 21 project upwardly from each of the arms 20. Each of the fingers 21 includes an inner face opposite to the remaining one of the fingers 21. A bulbous portion is formed on the inner face of each of the fingers 21 near a tip thereof thereby defining a narrow entrance to a recess defined between the two fingers.

A plate 22 includes a color identical to that of the frame 4. Two axles 24 project from the plate 22 in two opposite directions. Each of the axles 24 is pushed past the tips of the fingers 21 projecting from a corresponding one of the arms 20 so that each of the axles 24 is retained between the fingers 21 projecting from a corresponding one of the arms 20. Thus, the plate 22 is pivotably mounted on the frame 4. A magnet 26 includes a north pole at a tip and a south pole at an opposite tip. The magnet 26 is embedded in the plate 22. The tips of the magnet 26 are located between and in line with the upper tips of the ferromagnetic rods 8. The plate 22 defines a cutout 28 through which the upper tip of one of the ferromagnetic rods 8 and the LED 12 are inserted.

A reflector 30 includes a color different from that of the plate 22. The reflector 30 is adhered to the plate 22. The reflector 30 defines a cutout 32 through which the upper tip of one of the ferromagnetic rods 8 and the LED 12 are inserted. The reflector 30 conforms in profile to the plate 22.

The circuit 18 includes a first switch SW1, a second switch SW2 and a third switch SW3. The first switch SW1 is connected with an end of the wire 14. The second switch SW2 is connected with the remaining end of the wire 14. The third switch SW3 is connected with the LED 12. Each of the switches SW1 and SW2 can be turned between a ground electrode and a positive electrode.

As shown in FIG. 1, the first switch SW1 is turned to the positive electrode and the second switch SW2 is turned to the ground electrode so as to direct a current through the solenoids 16 in a first direction, thus producing a first magnetic field between the upper tips of the ferromagnetic rods 8. Then, both of the switches SW1 and SW2 can be turned to the positive electrode or the ground electrode whilst the first magnetic field remains.

The first switch SW1 can be turned to the ground electrode and the second switch SW2 is turned to the positive electrode so as to direct a current through the solenoids 16 in a second direction opposite to the first direction, thus producing a second magnetic field between the upper tips of the ferromagnetic rods 8. The

direction of the first magnetic field is opposite to the direction of the second magnetic field. Then, both of the switches SW1 and SW2 can be turned to the positive electrode or the ground electrode whilst the second magnetic field remains.

As mentioned above, the first magnetic field or the second magnetic field is produced between the upper tips of the ferromagnetic rods 8, therefore the plate 22 to which the magnet 26 is attached is turned between two opposite positions.

The third switch SW3 can be turned on so that LED 12 emits light. The LED 12 includes an upper tip which should be located above the combination of the plate 22 and the reflector 30 so that the LED 12 is clearly visible. The upper tip of the LED 12 should be located below the upper ends of the ferromagnetic rods 8 so that the combination of the plate 22 and the reflector 30 will not be hindered by means of the LED 12 when the combination of the plate 22 and the reflector 30 is pivoted to a position opposite to the position as shown in FIG. 1.

The ferromagnetic rods 8 and the ferromagnetic strip 17 can be replaced with a one-piece U-shaped ferromagnetic element (not shown).

If the magnetically operated display unit 2 is used in a vehicle (not shown), a transparent panel (not shown) is located in front of the magnetically operated display unit 2. When the vehicle is driven, there will be friction between air and the transparent panel thus resulting in a static charge in the transparent panel. The combination of the plate 22 and the reflector 30 is pivoted when it is in use thus resulting in a static charge in the magnetically operated display unit 2. The static charge produced in the transparent panel and the static charge produced in the magnetically operated display unit 2 will attract each other thus causing difficulty for the pivoting of the combination of the plate 22 and the reflector 30. Thus, the static charge produced in the magnetically operated display unit 2 should be removed. A conductive agent is added in plastic from which the frame 4, the plate 22 and the reflector 30 are made so that frame 4, the plate 22 and the reflector 30 are conductive to a limited extent for releasing the static charge to the leads of the LED 12 for removing the static charge.

Claims

1. A magnetically operated display unit (2) comprising
 - a frame (4) with a color,
 - a plate (22) pivotably mounted on the frame and including a first surface (30) with a color different to that of the frame (4) and a second surface with a color identical to that of the frame (4) and having a magnet (26) attached thereto,

two ferromagnetic rods (8), the tips of the magnet (26) being located between the upper tips of the ferromagnetic rods (8), the ferromagnetic rods having a solenoid for producing a first magnetic field and a second magnetic field having a direction opposite to the direction of the first magnetic field when opposite currents are selectively directed through the solenoid for turning the plate (22) with the attached magnet (26) between two opposite positions to selectively expose to view one surface of the plate (22) and

a light source mounted on the frame,

characterized in that

the light source is a light emitting diode and

the plate defines a cutout for receiving the light emitting diode (12) and one of the tips of the ferromagnetic rods (8) such that the tip of the light emitting diode (12) is located on a level above the plate (22) so that the light emitting diode is clearly visible.

2. A magnetically operated display unit (2) according to claim 1 comprising a switch for selectively switching the light emitting diode on and off.
3. A magnetically operated display unit (2) according to claim 1 or 2, wherein two solenoids are mounted each on a corresponding one of the ferromagnetic rods (8) and the solenoids (16) are different portions of a wire.
4. A magnetically operated display unit (2) according to any one of the preceding claims, wherein the tips of the magnet (26) are located between and in line with the upper tips of the ferromagnetic rods (8).
5. A magnetically operated display unit (2) according to any one of the preceding claims, wherein switches provided for selectively directing opposite currents through the solenoid (16) can be switched to a position where no current flows while the magnetic field remains.
6. A magnetically operated display unit (2) according to any one of the preceding claims, wherein the frame (4) includes a base defining two apertures through each of which a corresponding one of the ferromagnetic rods (8) is inserted.
7. A magnetically operated display unit (2) according to any one of the preceding claims including a reflector (30) attached to the first surface of the plate (22), the reflector (30) including a color different to

that of the frame.

8. A magnetically operated display unit (2) according to any one of the preceding claims, wherein the frame (4) and the plate (22) are made of plastic added with conductive agent so that the frame (4) and the plate (22) are conductive to a limited extent.
9. A magnetically operated display unit (2) according to any one of the preceding claims including an arm (20) projecting upwardly from the frame (4) and two fingers (21) projecting upwardly from the arm, each of the fingers (21) including an inner face opposite to the remaining one of the fingers (21) and a bulbous portion formed on the inner face thereof near a tip thereof, thereby defining a narrow entrance to a recess defined between the two fingers (21).

Patentansprüche

1. Magnetisch betriebene Display-Einheit (2), umfassend

einen Rahmen (4) mit einer Farbe,

eine an dem Rahmen schwenkbar montierte Scheibe (22) mit einer ersten Oberfläche (30), deren Farbe von der Farbe des Rahmens (4) verschieden ist, und einer zweiten Oberfläche, deren Farbe mit derjenigen des Rahmens (4) übereinstimmt, und mit einem an ihr befestigten Magneten (26),

zwei ferromagnetische Stäbe (8), wobei die Spitzen des Magneten (26) zwischen den oberen Enden der ferromagnetischen Stäbe (8) angeordnet sind und wobei die ferromagnetischen Stäbe eine Spule aufweisen, um ein erstes magnetisches Feld und ein zweites magnetisches Feld zu erzeugen, dessen Richtung entgegengesetzt zu der Richtung des ersten magnetischen Felds ist, wenn ein Strom selektiv in gegenläufige Richtungen durch die Spule fließt, um die Scheibe (22) mit dem daran befestigten Magneten (26) zwischen zwei entgegengesetzten Stellungen zu bewegen, bei denen selektiv eine der Oberflächen der Scheibe (22) für einen Betrachter sichtbar ist, und

eine an dem Rahmen befestigte Lichtquelle,

dadurch gekennzeichnet, daß

die Lichtquelle eine Leuchtdiode ist und

die Scheibe einen Ausschnitt zur Aufnahme der Leuchtdiode (12) und eines der Enden der fer-

romagnetischen Stäbe (8) aufweist, so daß die Spitze der Leuchtdiode in einer Ebene oberhalb der Scheibe (22) derartig angeordnet ist, daß sie klar sichtbar ist.

2. Magnetisch betriebene Display-Einheit (2) nach Anspruch 1, welche einen Schalter zum selektiven Ein- und Ausschalten der Leuchtdiode aufweist.

3. Magnetisch betriebene Display-Einheit (2) nach Anspruch 1 oder 2, bei welcher zwei Spulen jeweils auf einem entsprechenden ferromagnetischen Stab (8) befestigt sind und die Spulen (16) von verschiedenen Teilen eines Drahts gebildet werden.

4. Magnetisch betriebene Display-Einheit (2) nach einem der vorhergehenden Ansprüche, bei welcher die Spitzen des Magneten (26) zwischen den oberen Enden der ferromagnetischen Stäbe (8) und mit diesen fluchtend angeordnet sind.

5. Magnetisch betriebene Display-Einheit (2) nach einem der vorhergehenden Ansprüche, bei welcher Schalter, die dazu vorgesehen sind, Strom in entgegengesetzte Richtungen durch die Spule (16) fließen zu lassen, in eine Position gebracht werden können, bei der kein Strom fließt, während das magnetische Feld erhalten bleibt.

6. Magnetisch betriebene Display-Einheit (2) nach einem der vorhergehenden Ansprüche, bei welcher der Rahmen (4) eine Basis aufweist, in der zwei Öffnungen vorhanden sind, in die jeweils einer der ferromagnetischen Stäbe (8) eingesteckt ist.

7. Magnetisch betriebene Display-Einheit (2) nach einem der vorhergehenden Ansprüche, umfassend einen an der ersten Oberfläche der Scheibe (22) befestigten Reflektor (30), wobei der Reflektor eine von dem Rahmen verschiedene Farbe hat.

8. Magnetisch betriebene Display-Einheit (2) nach einem der vorhergehenden Ansprüche, bei welcher der Rahmen (4) und die Scheibe (22) aus einem mit einem elektrisch leitenden Mittel versehenen Kunststoff hergestellt sind, so daß der Rahmen (4) und die Scheibe (22) im beschränkten Umfang elektrisch leitend sind.

9. Magnetisch betriebene Display-Einheit (2) nach einem der vorhergehenden Ansprüche, umfassend einen von dem Rahmen (4) nach oben ragenden Arm (20) und zwei von dem Arm nach oben ragende Finger (21), wobei jeder der Finger (21) eine dem anderen Finger (21) gegenüberliegende Fläche aufweist und an der inneren Fläche nahe dem Oberende des Fingers ein vorgewölbter Abschnitt ausgebildet ist, so daß ein enger Einlaß zu einer zwi-

schen den beiden Fingern (21) gebildeten Ausnehmung entsteht.

Revendications

1. Élément d'affichage à commande magnétique (2) comprenant

un bâti (4) d'une couleur,

une plaque (22) montée pivotante sur le bâti et ayant une première surface (30) d'une couleur différente de celle du bâti (4) et une deuxième surface de la même couleur que le bâti (4) et à laquelle est fixé un aimant (26),

deux tiges ferromagnétiques (8), les extrémités de l'aimant (26) étant situées entre les extrémités supérieures de ces tiges (8), les tiges ayant un solénoïde pour la production d'un premier et d'un deuxième champs magnétiques de sens opposés lorsque des courants opposés sont envoyés sélectivement dans le solénoïde, pour faire tourner la plaque (22), avec l'aimant (26) fixé à elle, entre deux positions opposées pour exposer sélectivement à la vue une surface de la plaque (22), et

une source lumineuse montée sur le bâti,

caractérisé par le fait que

la source lumineuse est une diode lumineuse et la plaque a une échancrure destinée à recevoir la diode lumineuse (12) et une des extrémités des tiges ferromagnétiques (8) de façon que l'extrémité de la diode lumineuse (12) soit située à un niveau supérieur à celui de la plaque (22) afin que la diode lumineuse soit bien visible.

2. Élément d'affichage à commande magnétique (2) selon la revendication 1, comprenant un interrupteur pour l'allumage et l'extinction sélectives de la diode lumineuse.

3. Élément d'affichage à commande magnétique (2) selon l'une des revendications 1 et 2, dans lequel un solénoïde est monté sur chacune des tiges ferromagnétiques (8) et les solénoïdes (16) sont des parties différentes d'un fil.

4. Élément d'affichage à commande magnétique (2) selon l'une des revendications précédentes, dans lequel les extrémités de l'aimant (26) sont situées entre les extrémités supérieures des tiges ferromagnétiques (8) et alignées avec ces extrémités.

5. Élément d'affichage à commande magnétique (2)

selon l'une des revendications précédentes, dans lequel des interrupteurs prévus pour l'envoi sélectif de courants opposés dans le solénoïde (16) peuvent être commutés dans une position où il ne passe pas de courant tandis que le champ magnétique subsiste.

6. Élément d'affichage à commande magnétique (2) selon l'une des revendications précédentes, dans lequel le bâti (4) comporte une base qui a deux ouvertures par chacune desquelles est introduite une des tiges ferromagnétiques (8).

7. Élément d'affichage à commande magnétique (2) selon l'une des revendications précédentes, comportant un réflecteur (30) fixé à la première surface de la plaque (22), ce réflecteur (30) étant d'une couleur différente de celle du bâti.

8. Élément d'affichage à commande magnétique (2) selon l'une des revendications précédentes, dans lequel le bâti (4) et la plaque (22) sont faits de plastique additionné d'un agent conducteur de façon à être conducteurs dans une mesure restreinte.

9. Élément d'affichage à commande magnétique (2) selon l'une des revendications précédentes, comportant un bras (20) faisant saillie du bâti (4) vers le haut et deux doigts (21) faisant saillie de ce bras vers le haut, chacun des doigts (21) ayant une face intérieure opposée à l'autre doigt (21) et une partie bulbueuse faite sur sa face intérieure près d'une extrémité pour former une entrée étroite d'un creux formé entre les deux doigts (21).

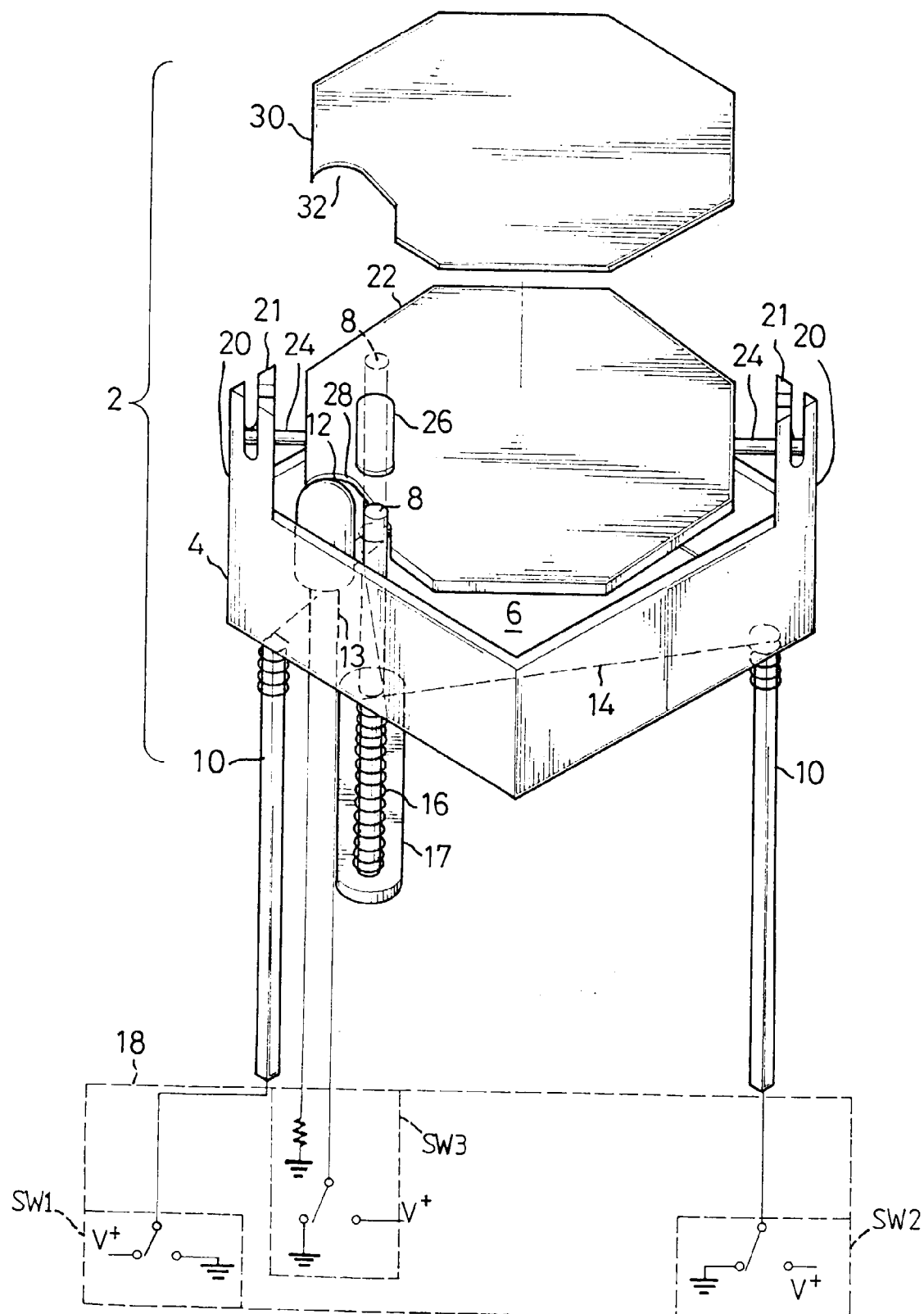


FIG. 1