(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 731 435 A1

(12) EUROPEAN PATENT APPLICATION

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

(51) Int. Cl.[6]: **G09F 9/37**

(21) Application number: **95301528.6**

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

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

(71) Applicant: **LITE VISION CORPORATION**
Taipei (TW)

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

(74) Representative: **Feakins, Graham Allan et al**
RAWORTH, MOSS & COOK
RAWORTH HOUSE
36 Sydenham Road
Croydon, Surrey CRO 2EF (GB)

(54) Magnetically operated display

(57) A magnetically operated display unit (2) includes a frame (4) with a color, a plate (22) pivotably mounted on the frame and including a first surface with a color different to that of the frame and a second surface with a color identical to that of the frame, a magnet (26) embedded in the plate, a U-shaped ferromagnetic element (8, 17) mounted on the frame so that two tips of the magnet (26) are located between two tips of the U-shaped ferromagnetic element (8, 17), a solenoid (16) mounted on the U-shaped ferromagnetic element and a light emitting diode (12) mounted on the frame. The plate defines a cutout for receiving the light emitting diode and one of the tips of the U-shaped ferromagnetic element. The light emitting diode includes a tip located on a level between the plate and the tips of the U-shaped ferromagnetic element. Two opposite currents are selectively directed through the solenoid.

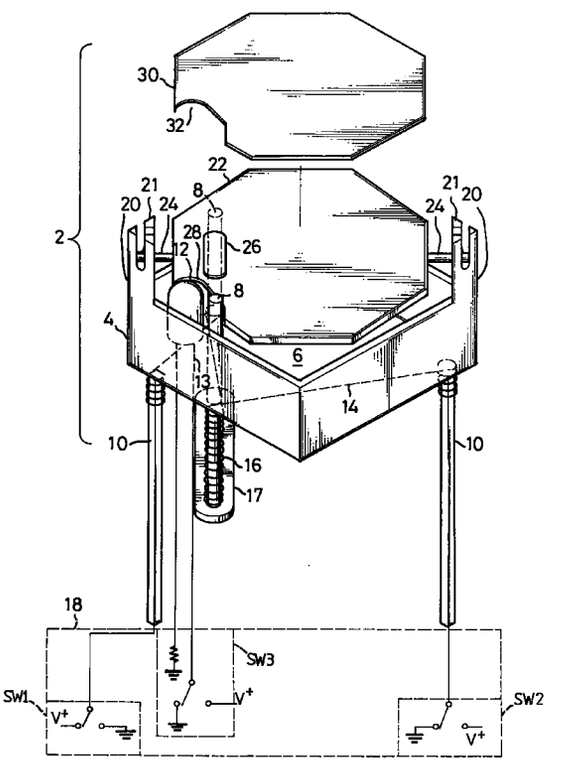

FIG.1

EP 0 731 435 A1

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.

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.

The magnetically operated display unit includes a frame with a color, a plate pivotably mounted on the frame and including a first surface with a color different to that of the frame and a second surface with a color identical to that of the frame, a magnet embedded in the plate, a U-shaped ferromagnetic element mounted on the frame so that two tips of the magnet are located between two tips of the U-shaped ferromagnetic element, a solenoid mounted on the U-shaped ferromagnetic element and a light emitting diode mounted on the frame. The plate defines a cutout for receiving the light emitting diode and one of the tips of the U-shaped ferromagnetic element. The light emitting diode includes a tip located on a level between the plate and the tips of the U-shaped ferromagnetic element. Two opposite currents are selectively directed through the solenoid.
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 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 comprising a frame with a color, a plate pivotably mounted on the frame and including a first surface with a color different to that of the frame and a second surface with a color identical to that of the frame, a magnet embedded in the plate, a U-shaped ferromagnetic element mounted on the frame so that two tips of the magnet are located between two tips of the U-shaped ferromagnetic element, a solenoid mounted on the U-shaped ferromagnetic element and a light emitting diode mounted on the frame, the plate defining a cutout for receiving the light emitting diode and one of the tips of the U-shaped ferromagnetic element, the light emitting diode including a tip located on a level between the plate and the tips of the U-shaped ferromagnetic element, two opposite currents selectively directed through the solenoid.

2. A magnetically operated display unit according to claim 1 wherein the U-shaped ferromagnetic element includes two ferromagnetic rods connected with each other by means of a ferromagnetic strip.

3. A magnetically operated display unit according to claim 2 including two solenoids each mounted on a corresponding one of the ferromagnetic rods.

4. A magnetically operated display unit according to claim 3 wherein the solenoids are different portions of a wire.

5. A magnetically operated display unit according to claim 4 including two pins attached to the frame, each of two ends of the wire soldered to a corresponding one of the pins.

6. A magnetically operated display unit according to claim 1 wherein the frame includes a base defining two apertures through each of which a corresponding one of two tips of the U-shaped ferromagnetic element is inserted.

7. A magnetically operated display unit according to claim 1 including a reflector attached to the first surface of the plate, the reflector including a color different to that of the frame.

8. A magnetically operated display unit according to claim 1 wherein the frame and the plate are made of plastic added with conductive agent so that the frame and the plate are conductive to a limited extent.

9. A magnetically operated display unit according to claim 1 including two arms projecting upwardly from the frame and two fingers projecting upwardly from each of the arms, each of the fingers including an inner face opposite to the remaining one of the fingers 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.

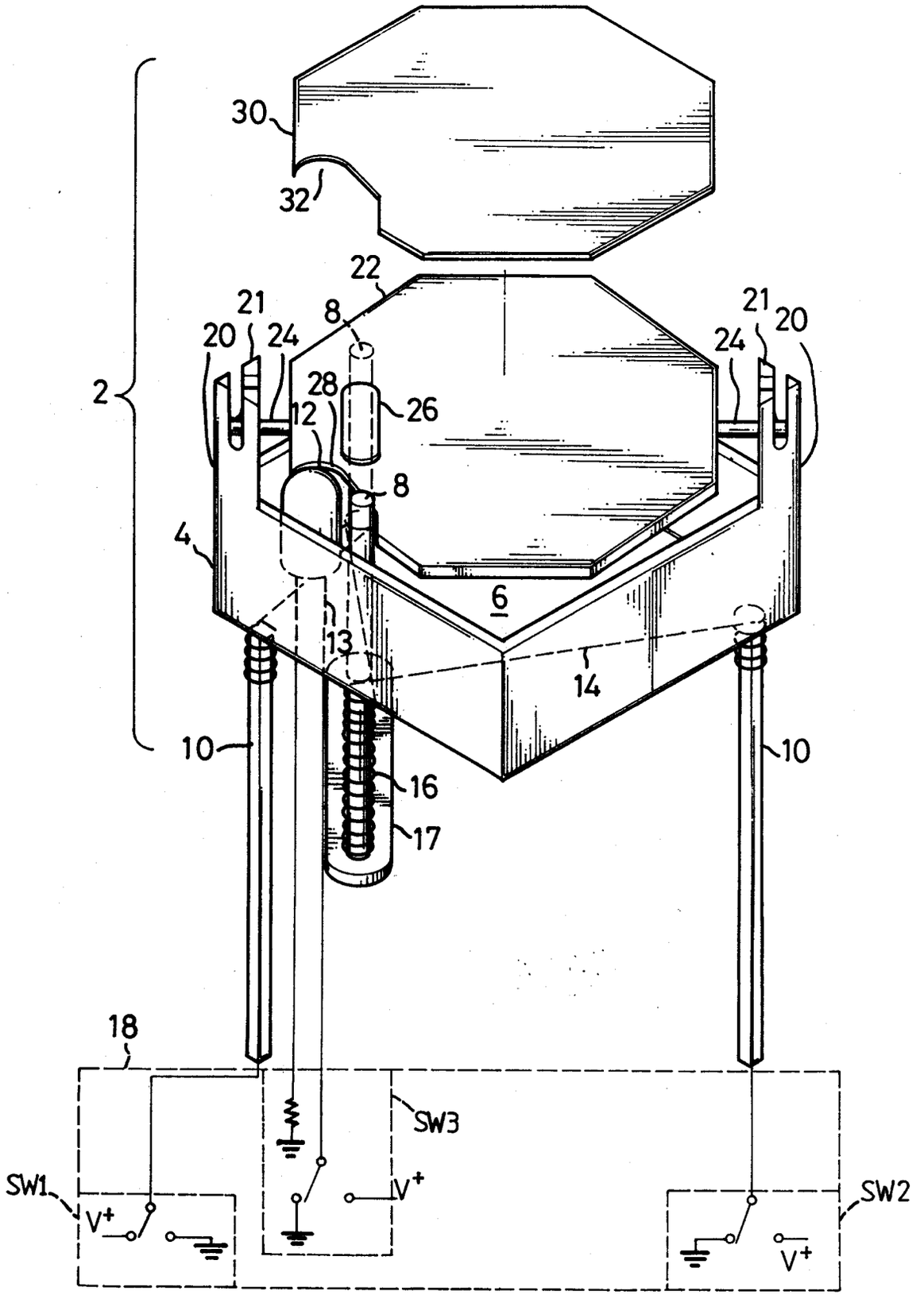

FIG. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 1528

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP-A-0 556 954 (DAYCO PRODUCTS CANADA INC.) * column 4, line 51 - column 12, line 26; figures 1-11 *	1-3,6-8	G09F9/37
A	WO-A-94 07231 (MOBITEC INTERNATIONAL AB) * page 10, line 11 - line 29; figures 3,4 *	1-3,6,7,9	
A	DE-A-39 16 283 (BODET) * column 4, line 34 - column 5, line 42; figures 2,3 *	1-3,7,8	
A	EP-A-0 401 980 (NEI CANADA LTD.) * column 5, line 31 - column 8, line 56; figures 1-7 *	1,7-9	
A	EP-A-0 463 725 (DAYCO PRODUCTS CANADA INC.) * column 3, line 29 - column 4, line 40; figures 1,2 *	1,7-9	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	19 June 1995	Taylor, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)