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(11) **EP 1 001 401 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
11.02.2004 Bulletin 2004/07

(51) Int Cl.7: **G09F 13/08, G09F 11/00**

(21) Application number: **98121512.2**

(22) Date of filing: **13.11.1998**

(54) **Display unit**

Anzeigeeinheit

Unité d'affichage

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
RO

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(43) Date of publication of application:
17.05.2000 Bulletin 2000/20

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(60) Divisional application:
03012810.2 / 1 347 431

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Description

Field of the Invention

[0001] The present invention relates to display units, and in particular to display units for displaying two or more consecutively changing images to be viewed by a viewer.

Background of the Invention

[0002] Multi-image display devices of various kinds are known. Such devices are used for advertisement, instructional purposes, providing directions, games and many other uses. These devices usually contain prisms revolving about their axes, or alternatively, devices projecting movies in a closed cycle. All such devices, however, require a substantial amount of electrical power for their operation, hence requiring connection to electrical mains. Furthermore, such devices are of necessity of a substantial size, due to the relative complexity of the required drive means and other parts thereof.

[0003] The basic optical principle of displacing a complex lithographic print relative to a lenticular lens array has been known from the prior art, e.g., U.S. Patent 5,494,445, which discloses general know-how for alternatively displaying several images. However, to date, this knowledge has not been properly utilized for advertising purposes. There exists a need for a dynamic, multi-image display to be used in shopping centers and other locations, which is capable of functioning independently when affixed to walls or attached to shelves, and which will present information regarding the products to be sold.

[0004] Such a display should be self-powered, namely, free of any connection to the mains. It must have the ability to present high-resolution images at a wide range of viewing angles, sometimes on both of its sides, for viewing by observers approaching from different directions. Maintenance considerations require an operating period of at least 3 to 4 months without battery replacement. The advertising messages must be easily replaceable by an unskilled worker on site, without any difficulty. The display unit should be cost-effective; in other words, its cost should not exceed the price of the product(s) it promotes.

[0005] From Japanese Patent Application HEI 2 [1990]-211437 an image display device is known, said image display device including the following facts: the image display device comprises an image carrier having two or more shrunken pixels set for each pixel group section and a cylindrical lens group which is set parallel to the image carrier and can display the predescribed image by means of a selective combination of the various pixels, and, through the cylindrical lens group, it can sequentially view the images corresponding to the relative movement between the cylindrical lens group and the image carrier; the driving mechanism for performing

the aforementioned relative movement comprises a driving device that can change the driving speed and driving direction, and a control unit which sends the operation signal to the driving device based on the preset relative movement pattern.

SUMMARY OF THE INVENTION

[0006] It is therefore a broad object of the present invention to provide a simple, inexpensive display unit based on optical principles, which is more easy to handle.

[0007] It is a further object of the present invention to provide a display unit, which is capable of consecutively displaying several high-resolution images and does not require connection to electrical mains.

[0008] It is further object of the present invention to provide a display unit for displaying a multiplicity of small or large consecutively changing images, which is capable of operating over an extended period of time and is powered by an independent power source.

[0009] It is another further object of the present invention to provide a cost-effective advertising display in which the message to be projected is easily replaceable and may be changed by an unskilled maintenance attendant having no technical background.

[0010] In accordance with the present invention, there is therefore provided a self-powered display unit for displaying at least two consecutively changing images to be viewed by a viewer, said unit comprising: a housing having at least two wall portions defining a cavity therebetween, at least one of said wall portions being made of an array of linear lenses having a lenticular front face and a flat rear face; at least one displaceable, lightweight, and substantially planar indicia carrier comprising a replaceable film slidably received through a slot in a surface of said housing and disposed inside said cavity at a distance from said rear face at most equalling a focal length of the lenses; and a high efficiency, low energy consumption, battery-powered DC drive means for periodically displacing said indicia carrier for a distance at least equalling the distance between two adjacent lenses of said array; said drive means comprising a motor coupled to a cam, a portion of a bottom edge of said indicia carrier being supported by said cam.

[0011] The invention will now be described in connection with certain preferred embodiments with reference to the following illustrative figures so that it may be more fully understood.

[0012] With specific reference now to the figures in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more

detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

Brief Description of the Drawings

[0013]

Fig. 1 is a cross-sectional view of the unit according to the present invention;
 Fig. 2 is a front view of an indicia carrier for displaying changing images in accordance with the present invention;
 Fig. 3 is a front view of the unit, displaying the letter A;
 Fig. 4 is a schematic side view of the drive means and an eccentric attached thereto;
 Fig. 5 is a frontal, partially cross-sectional view of a display unit, incorporating and showing in detail the drive means for actuating an eccentric similar to that of Fig. 4;
 Fig. 6 is a cross-sectional view of a further embodiment of a display unit according to the present invention;
 Fig. 7 is a partial, frontal, cross-sectional view of the display unit and a fitting for attaching it to a shelf;
 Figs. 8 and 9 are frontal and cross-sectional views, respectively, of a display unit according to the present invention and incorporating a clock;
 Figs. 10 and 11 are frontal and cross-sectional views, respectively, of a further embodiment of a display unit incorporating a clock;
 Fig. 11A is an enlarged detailed view of the encircled portion in Fig. 11;
 Fig. 12 illustrates a cam producing a step-wise movement of the indicia carrier;
 Fig. 13 is a schematic, cross-sectional view of an array of linear lenses having a cross-section conforming with that of *per se* known Fresnel lenses;
 Fig. 14 is a cross-sectional view of a display unit including the array of lenses shown in Fig. 13, and
 Fig. 15 is a cross-sectional view of a display unit in which the array of lenses shown in Fig. 13 is an integral part of a hollow, extruded panel.

Detailed Description of Preferred Embodiments

[0014] With reference to Figs. 1-3, there is seen a dis-

play unit 2 for displaying two or more consecutively changing images to be viewed by a viewer even without moving the line of sight. Unit 2 is composed of a housing 4 having a front face 6, constituted by an array of lenses 8. The lenses could be arranged to form a horizontally extending linear array as seen in Fig. 1, or alternatively, can constitute an array of a honeycomb, spherical, or other arrangement.

[0015] Located behind the stationary front face 6, there is movably disposed a light-weight indicia carrier 10 in the form of a sheet or film on one or two of its surfaces, on the surface(s) of which are printed indicia in a manner *per se* known, e.g., from U.S. Patents 5,100,330 or 5,488,451, or by any other method. The optical principle on which such methods are based is the ability to make visible each one of the multiple images printed on the surface(s) of carrier 10, by a minimal displacement thereof with respect to the array of lenses 8.

[0016] The indicia carrier 10 may be easily replaced with another, similar carrier by pulling the carrier out of slot 11 and slipping in a replacement carrier. This can be accomplished by any unskilled person.

[0017] As seen in Figs. 1 and 4, unit 2 further comprises a compartment 12 located at the bottom part of housing 4, which compartment accommodates electrically powered drive means 14 having an output axis 16. The details of construction of drive means 14 will be described hereinafter. On output axis 16 there is mounted an eccentric 18, seen to better advantage in Fig. 5, a limited portion of the periphery of which is arranged to project into the chamber 20 within which indicia carrier 10 is located, thereby causing the bottom edge 22 of the indicia carrier 10 to make contact with the bottom of a groove 24 provided along the circumference 26 of eccentric 18. Carrier 10 is freely supported within groove 24, but it is prevented from slipping off eccentric 18 when the latter rotates.

[0018] Referring now to Fig. 5, there is shown a front view of eccentric 18, on which, for illustrative purposes, there are drawn the shorter radius R_1 and the longer radius R_2 , the difference between which constitutes the displacement distance of indicia carrier 10. Optionally, eccentric 18 is furnished with a weight 28 disposed about the periphery at smaller radius R_1 , the purpose of which weight is to counterbalance some of the indicia carrier's weight upon its displacement in the upward direction.

[0019] A more detailed illustration of the invention is shown in Fig. 5, illustrating split housing 4, indicia carrier 10, guides 30, 32 for guiding the movement of the indicia carrier, and eccentric 18, on the circumference of which indicia carrier 10 rests. Also shown is the high-efficiency, low energy consumption drive means 14 for rotating eccentric 18, including electronic oscillator 34 powered by battery 36 and connected to electromagnet 38 having two ferromagnetic arms 40, 42. Each of the free ends of arms 40, 42 is configured as an armature 44, 46, surrounding but not contacting a magnetic core 48, directly

or indirectly coupled to transmission gears 50 52 for driving eccentric 18. Each pulse emitted by the oscillator effects a 180° rotation of core 48. The eccentric's contour is such that its rotation is translated into a linear displacement of the indicia carrier 10, which is freely supported on the grooved circumference of the eccentric, as described above. The radii R_1 and R_2 of eccentric 18 are calculated such that the total linear displacement of indicia carrier 10 in the upward and downward directions will be a distance at least equal to the distance D between two focal lines of two adjacent lenses located in the direction of displacement. The displacement of indicia carrier 10 by such an amplitude will effect a consecutive display of the images formed on the indicia carrier's surface. As indicia carrier 10 is of minimal weight, and in view of the efficient drive means described above, which uses energy only during the relatively short duration of the pulse generated by oscillator 34, the power required to operate the unit is also minimal; thus, the unit can operate over extended periods of time without requiring a change of battery. Naturally, the unit may also be powered or aided by solar cells.

[0020] While in Figs. 1-5 there is illustrated a unit displaying images on one side only, Fig. 6 illustrates an embodiment in which the changing images are displayed on two opposite sides of the unit. For achieving this, all that is required is to provide a second array of lenses 8' on the other face of the unit and to provide images on both surfaces of indicia carrier 10. Otherwise, the structure and operation of this embodiment are the same as described above with reference to Figs. 1-5.

[0021] Fig. 7 illustrates a cross-sectional view of a split housing 4 formed with a suitable opening 54 which engages fitting 56 for attaching unit 2 to a shelf, e.g., a merchandise display shelf in a supermarket or department store. Fitting 56 is designed to facilitate a flexible connection with unit 2 and a more rigid connection to a shelf, to avoid breaking if the unit is accidentally bumped by a passing customer or worker. The flexible connection between fitting 56 and unit 2 is achieved by means of an arm 58 engaging the opening 54 and held therein by friction. The more rigid connection is achieved by means of a metallic bracket 60.

[0022] Figs. 8-11 illustrate two embodiments for utilizing the display unit of the present invention in conjunction with a clock. The first of these embodiments is illustrated in Figs. 8 and 9, and shows a clock 62, operated by means of standard clock movement 64 disposed inside the housing 4 of unit 2, thus providing a combined clock and changing display unit. Obviously, the clock of Fig. 8 can also be a digital clock. In the second embodiment, illustrated in Figs. 10 and 11, the changing displays are positioned behind the clock face. Such positioning facilitates both the operation of clock 62 and changing of the displays on indicia carrier 10, by means of a common drive means 14.

[0023] As shown in Fig. 1 11A, eccentric 18 is fixedly attached to and driven by the seconds shaft 15 of com-

mon drive means 14 and moves inside a central hole 17 of suitable shape and size in carrier 10.

[0024] Fig. 12 shows an eccentric 28 or, more correctly, a cam, having three different radii of curvature r_1 , r_2 , r_3 , as well as ramps 29 leading from one curvature to the adjacent one. Also shown is a cam follower in the form of a roller 66 mounted in a fork 67 fixedly attached to indicia carrier 10. It is clear that when cam 28 rotates in the direction of arrow A, the roller 66 will start rolling along curvature r_1 . Since curvature r_1 is concentric with shaft 16, carrier 10 will remain stationary until roller 66, together with carrier 10, are lifted onto the next curvature r_2 by the ramp 29, from which point the roller 66 will "dwell" again until it is lifted once more by the next ramp 29 onto the next curvature r_3 , at which point the indicia carrier 10 will have reached its maximum displacement. Reaching the end of curvature r_3 , roller 66 will drop onto curvature r_1 , with carrier 10 again at its lowermost point. The cam thus has three "dwelling" portions and three ramps, and will turn a uniform rotation of its shaft 16 into a stepwise rise of indicia carrier 10. Such a cam is particularly useful for large display units observed from considerable distances, where the line of sight does not greatly deviate from the perpendicular relative to the unit.

[0025] The preparation of indicia carriers demands great accuracy, particularly in the dimensional relationship of indicia parameters and the pitch of the array of the lenses. While such accuracy is definitely achievable with small display units, it cannot possibly be realized with large units, because of inevitable cumulative errors in the preparation of the indicia carrier, the effects of temperature fluctuations, etc. Although in principle such problems could be alleviated by increasing the width of the linear lenses of the array, such a step would have serious disadvantages of its own:

1) As increasing the width of linear lenses, defined in cross-section by a circular arc, automatically also increases the lens thickness, arrays of lenses of increased width would be very heavy and, consequently, expensive.

2) The corrugated surfaces of the array produce highlights and glare, which interfere with the visibility of the image. They are also prone to dust deposition.

[0026] A solution to the above problems is provided by the array of lenses depicted in Figs. 13 and 14. This array is constituted by co-planar, advantageously internal groups of linear lenses having a cross-section conforming with that of the *per se* known Fresnel lenses, each group consisting of a central, substantially cylindrical lens, flanked by a number of quasi-prismatic linear lenses (quasi, because, strictly speaking, the slanting surfaces of these prisms are parts of cylindrical surfaces). Because of their large f number [in the case of the linear Fresnel lens, focal length f width m (Fig. 13)], this

type of lens offers a relatively large width (e.g., 40 mm) combined with a reasonably short focal length.

[0027] Fig. 13 is a schematic representation of a display unit using the above-mentioned array of quasi-prismatic linear lenses. There is seen in Fig. 13 an indicia carrier 10, located at a distance f behind an array 84 of the above-mentioned lenses. Array 84 is comprised of a plurality of groups 86, each group consisting of a central, substantially cylindrical lens 88, flanked by a plurality of linear, quasi-prismatic lenses 90. Advantageously, array 84 is one integral whole, e.g., produced by extrusion or embossing, although it can also be built up from several parts, particularly for large display units. As can be seen, the surface facing the viewer is completely smooth and is far less subject to reflective and glare phenomena and dust accretion.

[0028] Fig. 14 shows a display unit in which the array 84 of Fig. 13 is produced by extrusion and is provided with ribs 92, which both stiffen array 84 and prevent indicia carrier 10 from bulging. Carrier 10 is moved up and down, as indicated by double arrow B , by any of the previously described means. The display unit of Fig. 14 can also be provided with a light source, such as a battery of fluorescent tubes 94.

[0029] The unit of Fig. 15 is similar to that of Fig. 14, except that array 84 constitutes the front surface of a hollow, extruded panel, the rear surface 96 of which is connected to array 84 by means of ribs 92. This embodiment is thus exceptionally rigid and is therefore suitable for very large display units.

[0030] It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrated embodiments and that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

Claims

1. Self-powered display unit (2) for displaying at least two consecutively changing images to be viewed by a viewer, said unit (2) comprising:

a housing (4) having at least two wall portions defining a cavity therebetween, at least one of said wall portions being made of an array of linear lenses (8) having a lenticular front face and a flat rear face;

at least one displaceable, light-weight, and substantially planar indicia carrier (10) comprising a replaceable film slidably received

through a slot (11) in a surface of said housing (4) and disposed inside said cavity at a distance from said rear face at most equalling a focal length (f) of the lenses (8); and

a high efficiency, low energy consumption, battery-powered DC drive means (14) for periodically displacing said indicia carrier (10) for a distance at least equalling the distance between two adjacent lenses of said array; said drive means (14) comprising a motor coupled to a cam (18, 28), a portion of a bottom edge of said indicia carrier (10) being supported by said cam (18, 28).

2. Display unit according to claim 1, **characterized in that** said motor is an electric motor powered by a solar cell arrangement.
3. Display unit according to claim 1 or 2, **characterized in that** said motor is an impulse-driven stepping motor having a shaft.
4. Display unit according to claim 3, characterized in that said impulse-driven stepping motor produces impulses and each of the impulses produced by said impulse-driven stepping motor rotates the shaft of said stepping motor by 180° .
5. Display unit according to claim 3 or 4, **characterized in that** said shaft rotates at a speed between 2 and 4 r.p.m.
6. Display unit as according to one of the foregoing claims, **characterized in that** said cam is an eccentric (18, 28).
7. Display unit according to one of the foregoing claims, **characterized in that** said cam (18, 28) is provided with a peripherally disposed weight (28) to counterbalance at least some of said indicia carrier's weight upon its displacement in the upward direction.
8. Display unit according to one of the foregoing claims, **characterized in that** said indicia carrier (10) is translucent so as to allow light to pass there-through.
9. Display unit according to one of the foregoing claims, **characterized in that** said at least two wall portions are parallel to one another, a second of said wall portions is made of an array of lenses (8), and said indicia carrier (10) comprises displayable indicia on both of its sides for simultaneously displaying images on two sides of said unit (2).
10. Display unit according to one of the foregoing claims, **characterized in that** said housing (4) fur-

ther comprises means (54, 58, 60) for affixing the unit onto a shelf.

11. Display unit according to one of the foregoing claims, **characterized in that** said replaceable film comprises a sheet. 5
12. Display unit according to one of the foregoing claims, **characterized in that** a total rise of said cam (28) substantially equals a required displacement distance of said indicia carrier (10). 10
13. Display unit according to one of the foregoing claims, **characterized in that** said display unit (2) forms a clock (62) with a changing clock face. 15
14. Display unit as claimed in claim 13, **characterized in that** said cam (28) is fixedly attached to a seconds shaft (15) of a standard clock drive. 20
15. Display unit according to one of the foregoing claims, **characterized in that** each of the linear lenses has a cross-section conforming with a cross-section of a Fresnel lens, and said array of linear lenses forms a front wall of an extruded, hollow, two-sided panel, a rear wall of said two-sided panel being connected to said front wall by a plurality of ribs. 25

Patentansprüche

1. Selbstbetriebene Anzeigeeinheit (2) zum Anzeigen von wenigstens zwei fortlaufend wechselnden, von einem Betrachter anzusehenden Bildern, wobei die Einheit (2) umfasst: 30

ein Gehäuse (4) mit wenigstens zwei Wandabschnitten, welche zwischen sich einen Hohlraum festlegen, wobei wenigstens einer der Wandabschnitte aus einer Anordnung linearer Linsen (8) mit einer linsenförmigen Vorderseite und einer flachen Rückseite hergestellt ist; wenigstens einen verschiebbaren, leichten und im Wesentlichen ebenflächigen Kennzeichenträger (10), welcher einen austauschbaren Film aufweist, der durch einen Schlitz (11) in einer Oberfläche des Gehäuses (4) gleitend aufgenommen ist, und welcher Träger innerhalb des Hohlraums in einem Abstand von der Rückseite angeordnet ist, welcher höchstens der Brennweite (f) der Linsen (8) entspricht; und eine hochwirksame, batteriegetriebene Gleichstrom-Antriebseinrichtung (14) mit geringem Energieverbrauch zum periodischen Verschieben des Kennzeichenträgers (10) über eine Strecke, die wenigstens dem Abstand zwischen zwei benachbarten Linsen der Anordnung entspricht; 40

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wobei die Antriebseinrichtung (14) einen an einen Nocken (18, 28) gekoppelten Motor aufweist und ein Abschnitt einer Unterkante des Kennzeichenträgers (10) durch den Nocken (18, 28) abgestützt ist.

2. Anzeigeeinheit nach Anspruch 1, **dadurch gekennzeichnet, dass** der Motor ein durch eine Solarzellenanordnung angetriebener Elektromotor ist.
3. Anzeigeeinheit nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Motor ein impulsgetriebener Schrittmotor mit einer Welle ist.
4. Anzeigeeinheit nach Anspruch 3, **dadurch gekennzeichnet, dass** der impulsgetriebene Schrittmotor Impulse erzeugt und jeder der durch den Impuls getriebenen Schrittmotor erzeugten Impulse die Welle des Schrittmotors um 180° dreht.
5. Anzeigeeinheit nach Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** die Welle mit einer Geschwindigkeit zwischen 2 und 4 Umdrehungen pro Minute rotiert.
6. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken ein Exzenter (18, 28) ist.
7. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken (18, 28) mit einem umfangsseitig angeordneten Gewicht (28) versehen ist, um wenigstens einen Teil des Gewichts des Kennzeichenträgers bei dessen Verschiebewegung in der Aufwärtsrichtung auszugleichen. 35
8. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Kennzeichenträger (10) transparent ist und damit ein Hindurchtreten von Licht gestattet. 40
9. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** wenigstens zwei Wandabschnitte parallel zueinander angeordnet sind, ein zweiter der Wandabschnitte aus einer Anordnung von Linsen (8) gebildet ist und der Kennzeichenträger (10) verschiebbare Kennzeichen auf seinen beiden Seiten zum gleichzeitigen Anzeigen von Bildern auf zwei Seiten der Einheit (2) aufweist. 45
10. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Gehäuse (4) ferner eine Einrichtung (54, 58, 60) zum Befestigen der Einheit an einem Regal aufweist. 50

11. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der austauschbare Film ein Blatt aufweist.
12. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** eine vollständige Aufwärtsbewegung des Nockens (28) einem erforderlichen Verschiebeweg des Kennzeichenträgers (10) im Wesentlichen entspricht.
13. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Anzeigeeinheit (2) eine Uhr (62) mit einem wechselnden Uhrenzifferblatt bildet.
14. Anzeigeeinheit nach Anspruch 13, **dadurch gekennzeichnet, dass** der Nocken (28) fest an einer Sekunden-Welle (15) eines Standard-Uhrenantriebs fixiert ist.
15. Anzeigeeinheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jede der linearen Linsen einen Querschnitt hat, welcher mit einem Querschnitt einer Fresnel-Linse übereinstimmt, und die Anordnung linearer Linsen eine Vorderwand einer extrudierten, hohlen, zweiseitigen Tafel bildet, wobei eine Rückwand der zweiseitigen Tafel mit der Vorderwand über mehrere Rippen verbunden ist.

Revendications

1. Unité d'affichage (2) à alimentation interne pour afficher au moins deux images changeant consécutivement devant être visualisées par un observateur, ladite unité (2) comprenant :
- un boîtier (4) ayant au moins deux parties de paroi délimitant une cavité, au moins une partie de paroi dudit boîtier étant constituée d'un réseau de lentilles (8) linéaires ayant une face frontale lenticulaire et une face arrière plate ; au moins un support (10) de signe(s) informatif (s) sensiblement plan, léger et déplaçable, comprenant un film remplaçable pouvant être reçu par glissement à travers une fente (11) dans une surface dudit boîtier (4) et placée à l'intérieur de ladite cavité à distance de ladite face arrière plate à une distance au plus égale à la distance focale des lentilles (8) ; et des moyens d'entraînement (14) à courant continu alimentés par pile, à haut rendement et faible consommation énergétique, pour déplacer périodiquement ledit support (10) de signe(s) informatif(s) d'une distance au moins égale à la distance entre deux lentilles adjacentes dudit réseau,
- lesdits moyens d'entraînement (14) comprenant un moteur couplé à une came (18, 28), une partie du bord inférieure du support (10) de signe(s) informatif(s) étant supporté par la came (18, 28).
2. Unité d'affichage selon la revendication 1, **caractérisée en ce que** ledit moteur est un moteur électrique alimenté par un système à pile solaire.
3. Unité d'affichage selon la revendication 1 ou 2, **caractérisée en ce que** ledit moteur est un moteur pas à pas commandé par impulsions, qui a un arbre.
4. Unité d'affichage selon la revendication 3, **caractérisée en ce que** le moteur pas à pas commandé par impulsion génère des impulsions et chacune desdites impulsions fait tourner l'arbre dudit moteur pas à pas de 180°.
5. Unité d'affichage selon la revendication 3 ou 4, **caractérisée en ce que** ledit arbre tourne à une vitesse comprise entre 2 et 4 tours par minute.
6. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** lesdits moyens à came sont un excentrique (18, 28).
7. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** la came (18, 28) est munie d'un poids (28) disposé sur la périphérie pour équilibrer au moins une partie du poids du support de signe(s) informatif(s) lors de son déplacement dans la direction vers le haut.
8. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** ledit support (10) de signe(s) informatif(s) est translucide de manière à permettre à la lumière de le traverser.
9. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce qu'**au moins deux parties de parois sont parallèles entre elles, la seconde de ces parois est constituée d'un réseau de lentilles (8), et le support (10) de signe(s) informatif(s) comprend des signes informatifs affichables sur chacune de ses faces pour afficher simultanément des images sur les deux faces de ladite unité.
10. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** ledit boîtier (4) comprend de plus des moyens (54, 58, 60) pour fixer l'unité sur une étagère.
11. Dispositif d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** le film remplaçable comprend une feuille.

12. Dispositif d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** la course totale de la came (28) est sensiblement égale à la distance de déplacement requise du support (10) de signe(s) informatif(s). 5
13. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** ladite unité (2) est de la forme d'une horloge (62) avec une face d'horloge changeante. 10
14. Unité d'affichage selon la revendication 13, **caractérisée en ce que** la came (28) est montée de manière fixe sur l'arbre des secondes d'un moteur de montre standard. 15
15. Unité d'affichage selon l'une des revendications précédentes, **caractérisée en ce que** chacune des lentilles dudit réseau est une lentille linéaire d'une section transversale conforme à la section transversale d'une lentille de Fresnel, et ledit réseau de lentilles linéaires constitue la paroi avant d'un panneau bi-face creux extrudé, la paroi arrière dudit panneau étant reliée à ladite paroi avant par une pluralité de nervures. 20
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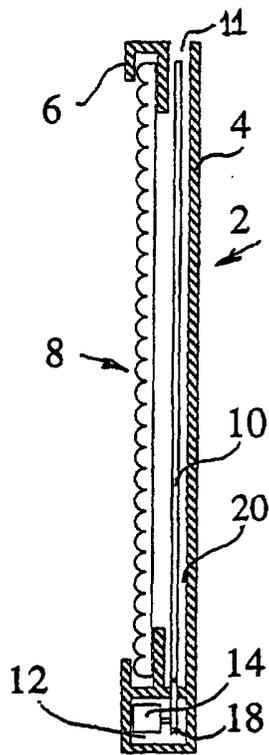


Fig 1

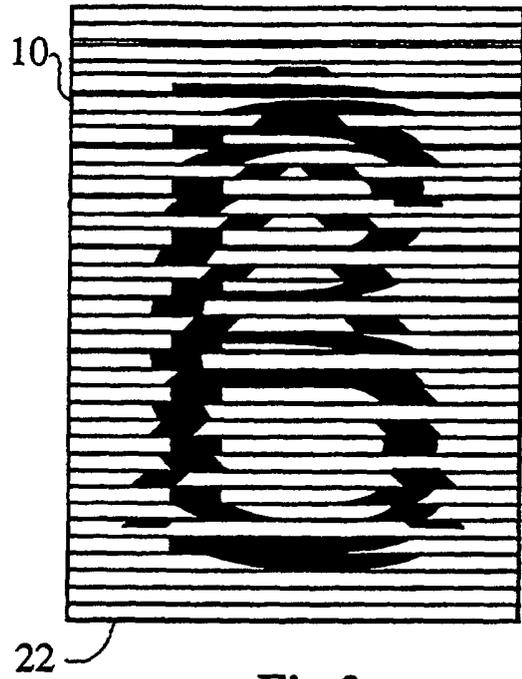


Fig 2

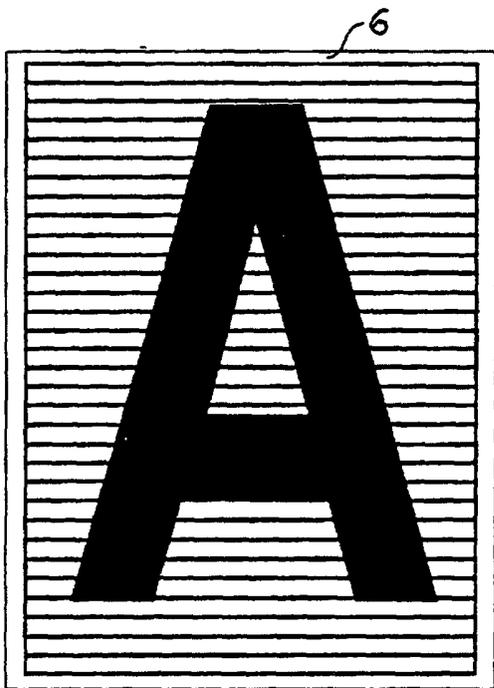


Fig 3

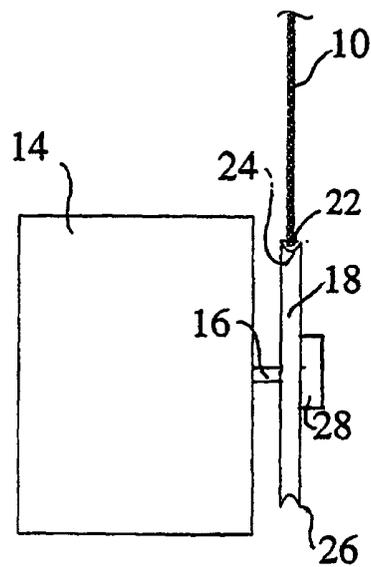


Fig 4

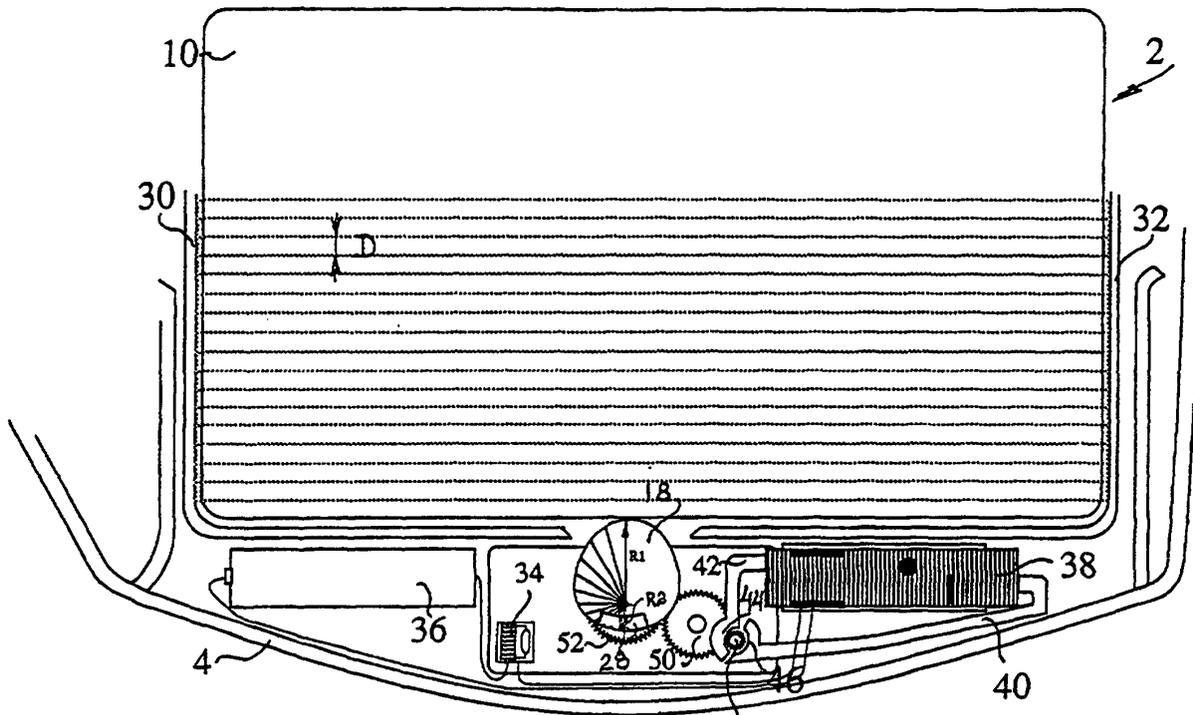


Fig. 5

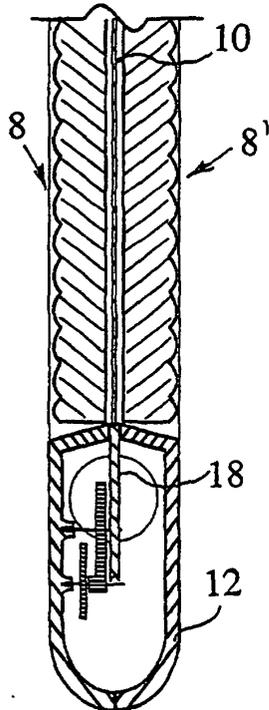


Fig. 6

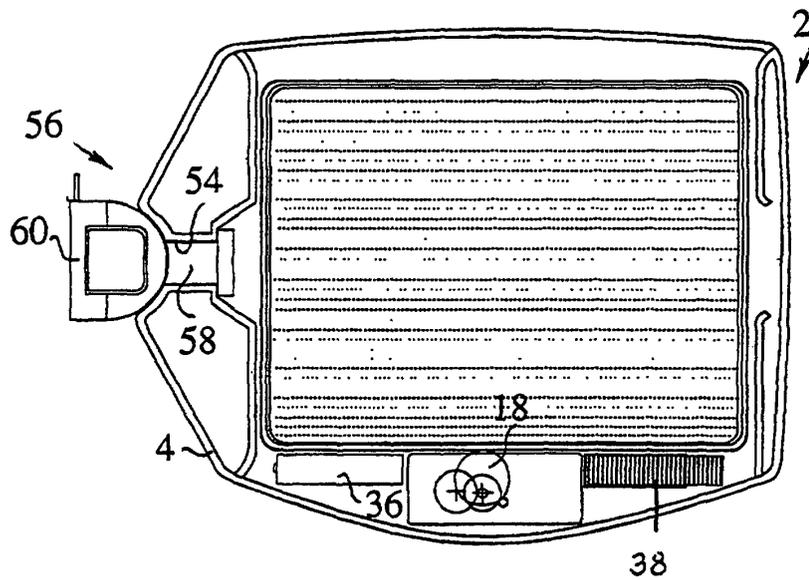


Fig. 7

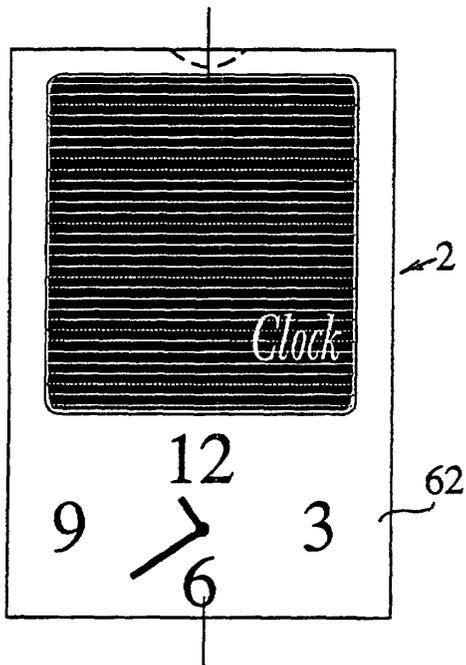


Fig. 8

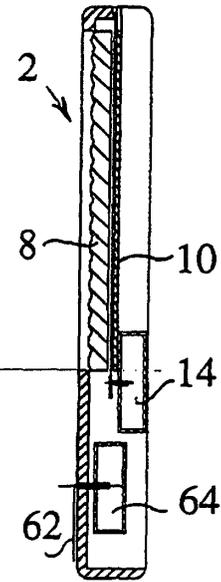


Fig. 9

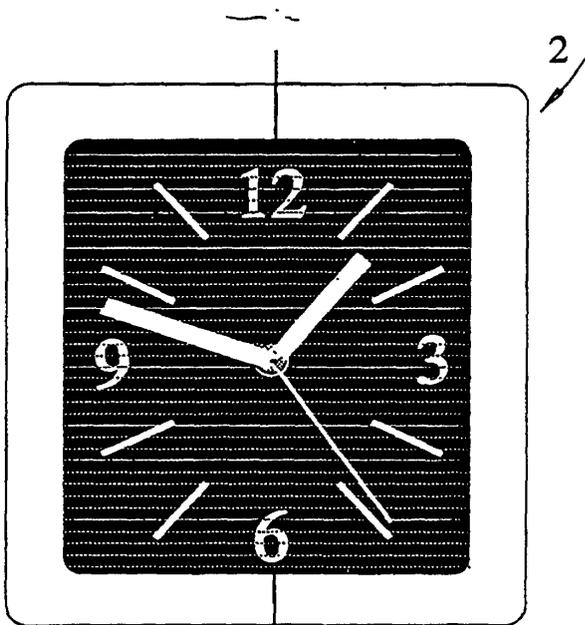


Fig. 10

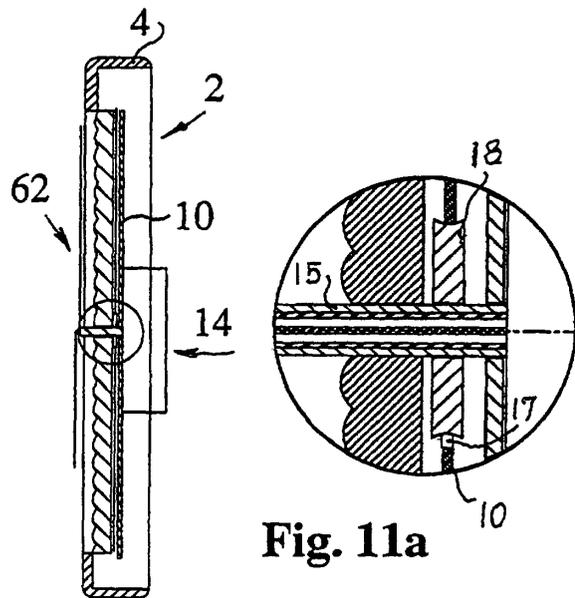


Fig. 11a

Fig. 11

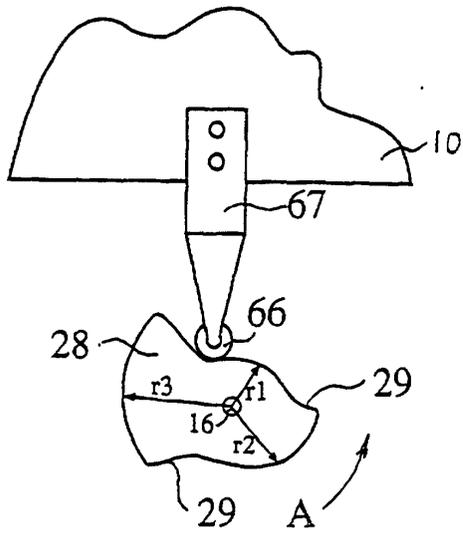


Fig.12

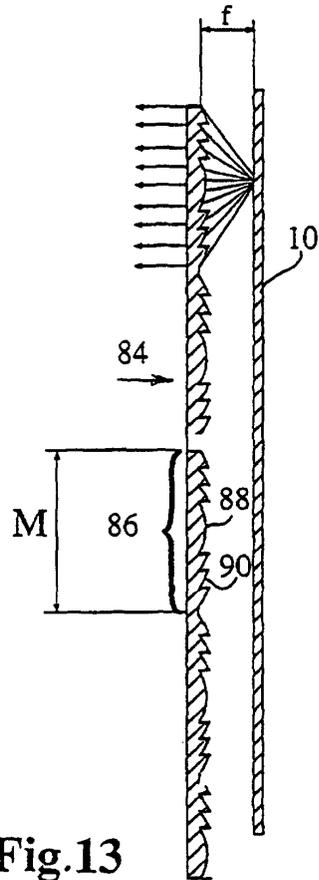


Fig.13

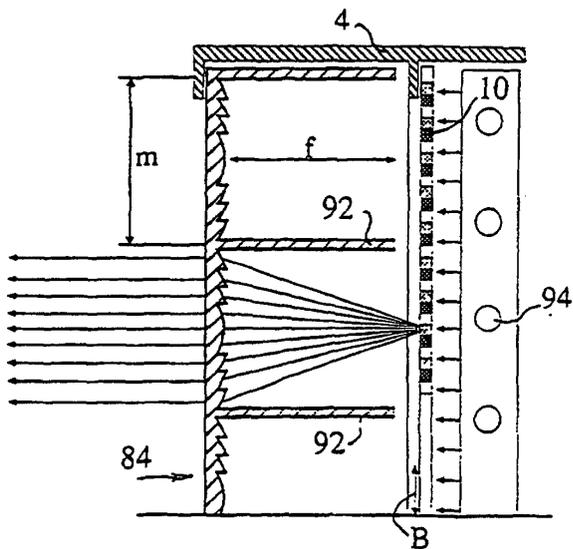


Fig.14

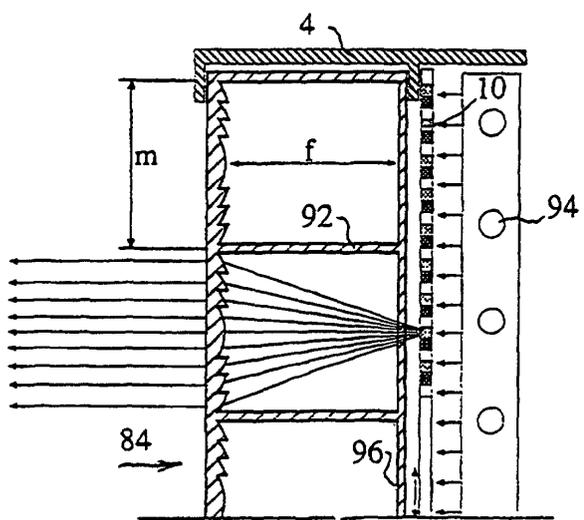


Fig.15