

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
3 March 2005 (03.03.2005)

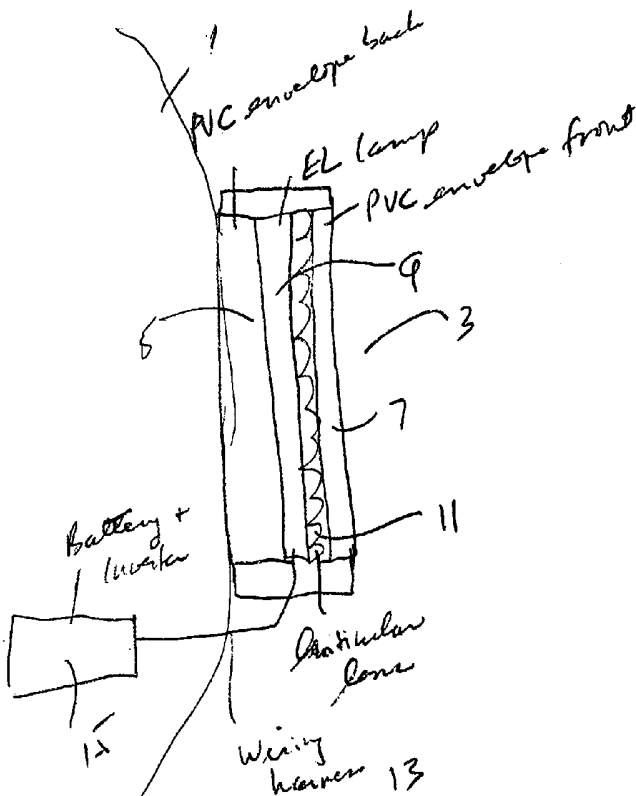
PCT

(10) International Publication Number  
WO 2005/018353 A2

- (51) International Patent Classification<sup>7</sup>: A41D [US/US]; 13657 West Sunset Blvd., Pacific Palisades, CA 90272 (US).
- (21) International Application Number: PCT/US2004/026766
- (22) International Filing Date: 19 August 2004 (19.08.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
  - 60/497,001 20 August 2003 (20.08.2003) US
  - 10/920,924 18 August 2004 (18.08.2004) US
- (71) Applicant (for all designated States except US): LIGHT-SPORT PRODUCTS, INC. [US/US]; 7125 Industrial Blvd., El Paso, TX 79915 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): ONO, Bryan, K.
- (74) Agent: GUNTER, Charles, D., Jr.; Whitaker, Chalk, Swindle & Sawyer, LLP, 3500 City Center Tower II, 301 Commerce Street, Fort Worth, TX 76102-4186 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

[Continued on next page]

(54) Title: LENTICULAR DISPLAY BACKLIT BY AN ELECTRO-LUMINESCENT LIGHT SOURCE



(57) Abstract: The present invention provides an article of clothing with a backlit translucent lenticular lens display that emits light that allows animation and special effects by design which can distinguish the user by the performance of an article of clothing. A garment has attached to a surface a display module having a substantially flat PVC envelope enclosing an electro-luminescent lamp layer and a translucent lenticular lens layer. The electro-luminescent lamp layer is energized by an electrical signal from a control electronic circuit. The electro-luminescent layer may be divided into segments where each segment functions as an independent electro-luminescent layer receiving a potential having a pattern of illumination that is determined by the control electronic circuit. The invention can be used in safety apparel where the resulting pattern is a bright surface having the shape of a caution warning

WO 2005/018353 A2



European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *without international search report and to be republished upon receipt of that report*

- 1 -

**LENTICULAR DISPLAY BACKLIT BY AN ELECTRO-LUMINESCENT LIGHT SOURCE**DescriptionTechnical Field

This invention is related to garments having dynamic optical displays on their surface. In particular it is related to such displays employing an electro-luminescent light source

5

Background Art

Garments are known that have designs on acetate layers illuminated by an electro-luminescent lamp. Garments and accessories with lenticular layers are also known. The combination of a lenticular luminescent screen having a base plate of a transparent material containing a substance capable of emitting luminescent light in response to stimulating light is known in patent 5,021,931. However the combination in a garment having a lenticular translucent design backlit by an electro-luminescent layer is not previously known and thus the prior art does not disclose a convenient manner for creating effective bright displays on a surface of the garment.

15

Disclosure of Invention

In view of the aforesaid drawback of the conventional systems, it is an object of the present invention to provide a more effective luminescent system for use on a garment allowing a greater degree of brightness and greater control over the details of the display.

20

In one embodiment the invention comprises a garment having attached to a surface thereof a display module that comprises a substantially flat PVC envelope having a transparent front surface. Inside the envelope is an electro-luminescent lamp layer and a translucent lenticular lens layer that has the effect of diffusing the light from the electro-luminescent lamp layer.

25

To energize the electro-luminescent lamp layer an electrical signal is brought from a

- 2 -

battery power source and an electrical inverter under the control of an control  
electronic circuit that determines when the layer emits light. A more complex  
arrangement has the electro-luminescent layer divided into segments where each  
segment functions as an independent electro-luminescent layer receiving a potential  
5 having a pattern of illumination that is determined by the control electronic circuit.

The invention can be used in safety apparel where the resulting pattern is a bright  
surface having the shape of a caution warning. The present invention provides an  
article of clothing with a backlit translucent lenticular lens display that emits light  
10 that allows animation and special effects by design which can distinguish the user  
by the performance of an article of clothing.

#### Brief Description of Drawings

Figure 1 depicts a cross section of a display module of the present invention.

15

Figure 2 depicts a electro-luminescent layer that is divided into independent  
segments.

Figure 3 depicts a garment shown in an exploded view and in perspective the  
20 components of a display sewn thereon.

#### Best Mode for Carrying Out the Invention

As shown in Figure 1, a garment 1 has attached to a surface thereof a display  
module 3. The module may be attached either permanently by being sewn or stapled  
25 to the garment or by use of a removable attachment mechanism such as velcro,  
snaps, zippers or the like. The module 3 comprises an envelope having a transparent  
surface such as a substantially flat PVC envelope having a back surface 5 for  
attachment to the garment 1 and a transparent front surface 7. The transparency  
of the front surface 7 need not be total, but need only be sufficiently transparent to  
30 allow light from inside the envelope to escape through the front surface. Inside the  
envelope is an electro-luminescent lamp layer 9 in contact with the back surface of  
the envelope. In contact with this layer is a lenticular lens layer 11, which is in

- 3 -

contact with the front surface 7 of the PVC envelope. The lenticular lens layer 11 is preferably translucent and has the effect of diffusing the light from the electro-luminescent lamp layer.

5 To energize the electro-luminescent lamp layer 11 a signal is brought by a wiring harness 13 from a pack 15 comprising a battery power source and an electrical inverter. The function of the inverter is to convert the direct current from the battery to an alternating current known to persons of skill in this art as sufficient to cause the electro-luminescent layer to emit light. The pack further comprises a control  
10 electronic circuit that determines when the layer 9 emits light. A simple control might only cause the layer 9 to flash periodically. A more complex arrangement could involve a electro-luminescent layer that is divided into segments. This is shown in Figure 2, which depicts such a layer divided into segments 17. In effect each segment functions as an independent electro-luminescent layer receiving a  
15 potential from the inverter and having a pattern of illumination that is determined by the control electronic circuit. The segments 17, can be as small as desired in order to provide a display of any desired detail.

The lenticular lens layer 11, which is preferably translucent, provides a uniform  
20 intensity of light from the electro-luminescent layer and efficiently brings the light from the layer to pass through the front surface of the PVC envelope.

Figure 3 depicts the various elements in an exploded view shown in perspective in conjunction with a garment.

25 In use, the garment has the PVC envelope attached to a surface thereof. When turned on, electrical signals from the pack 15 under control of the control electronic circuit, which may be nothing more than an array of switching circuits in conjunction with timing circuits arranged to produce a desired visible pattern, cause the elements  
30 of the electro-luminescent layer to emit light. The light from the electro-luminescent layer is focused by elements of the lenticular layer and exit from the front surface of the PVC layer. This could be done for example in conjunction with safety apparel

- 4 -

where the resulting pattern is a bright surface having the shape of a caution warning. This would enable the wearer to be safely identified even in darkness, rain, smoke and fog and in low light conditions where visibility is limited.

5 The present invention provides additional advantages. In particular it provides an article of clothing with a backlit translucent lenticular lens display that emits light. Unlike constant lighting displays the present invention allows animation and special effects by design which can distinguish the user by the performance of an article of clothing.

10

Although the invention has been discussed in terms of a particular embodiments it will be understood by persons of skill in this art that it encompasses any use of its technology as described in the following claims.

Claims

What is claimed is:

- 5 1. A garment having a display module, comprising:  
a PVC envelope attached to an outside surface thereof, said PVC envelope comprising a back surface and a transparent front surface, said envelope containing:  
an electro-luminescent lamp layer that emits light in response to a driving electrical potential, and  
10 a translucent lenticular lens layer receiving light from said electro-luminescent lamp layer and transmitting said light through said transparent front surface;  
an electrical inverter receiving power from a battery and providing the driving potential to the electro-luminescent lamp layer in response to a control electronic  
15 circuit.
2. The garment of claim 1, wherein the electro-luminescent lamp layer is comprised of segments that separately emit light in response to driving electrical potential controlled by a control electronic circuit.  
20
3. The garment of claim 1, wherein the electro-luminescent lamp layer flashes in response to signals from said control electronic circuit.
4. The garment of claim 2, wherein segments of said electro-luminescent lamp layer  
25 separately flash in response to signals from said control electronic circuit.
5. The garment of claim 2, wherein segments of said electro-luminescent lamp layer are separately illuminated in response to signals from said control electronic circuit to create an animated image visible through the transparent front surface of said PVC  
30 envelope.
6. The garment of claim 1, wherein said PVC envelope is sewn on the garment.

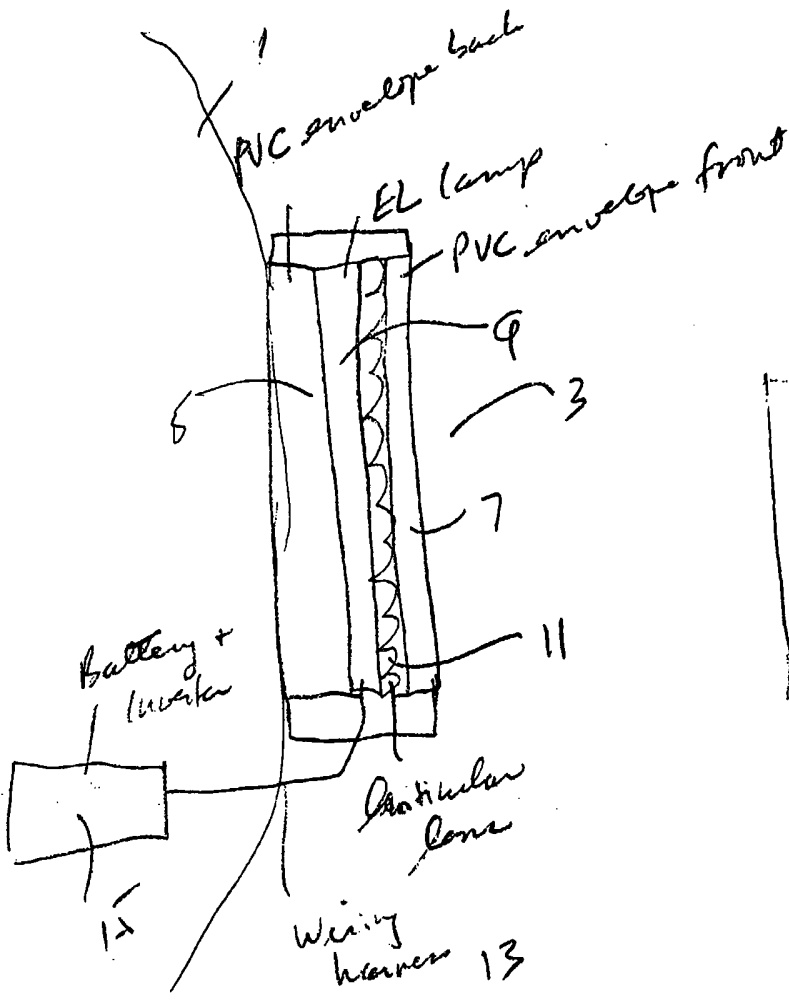


Fig. 1

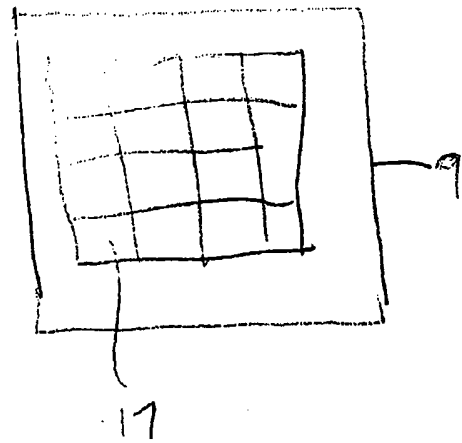
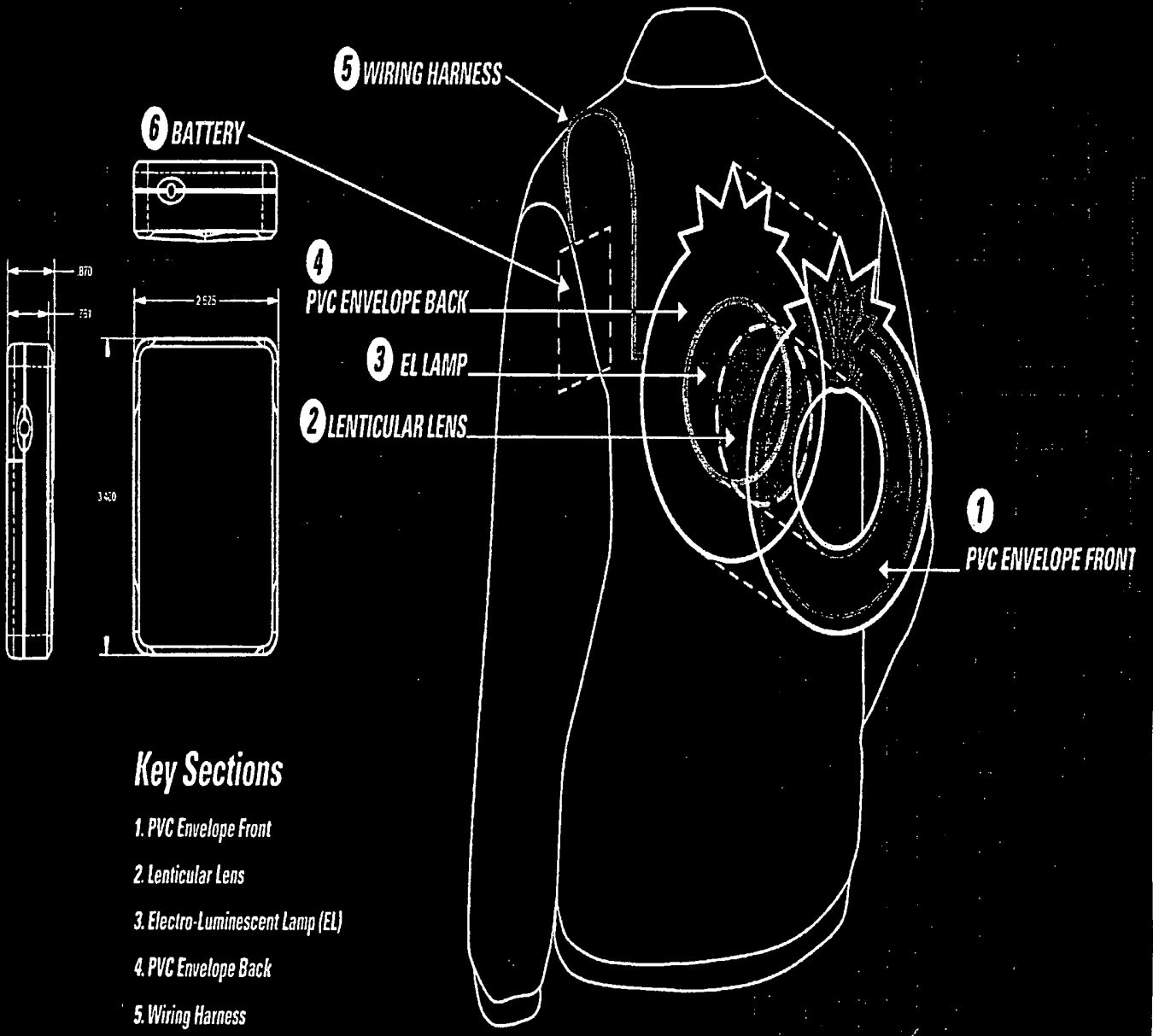


Fig 2

FIG. 3



**Key Sections**

- 1. PVC Envelope Front
- 2. Lenticular Lens
- 3. Electro-Luminescent Lamp (EL)
- 4. PVC Envelope Back
- 5. Wiring Harness
- 6. Battery



Invented by Bryan Ono and Julz Chavez  
February 1, 2003