



US 20120055055A1

(19) **United States**
(12) **Patent Application Publication**
Kunowski

(10) **Pub. No.: US 2012/0055055 A1**
(43) **Pub. Date: Mar. 8, 2012**

(54) **SYSTEMS AND METHOD FOR OUTDOOR MEDIA SIGNAGE**

B32B 37/18 (2006.01)
G09F 13/04 (2006.01)

(75) Inventor: **Jeffrey Kunowski**, Avondale, AZ (US)

(52) **U.S. Cl.** **40/544; 40/541; 156/306.6**

(73) Assignee: **Illumin8 Outdoor Media, LLC**, Avondale, AZ (US)

(57) **ABSTRACT**

(21) Appl. No.: **13/197,081**

An illuminated signage system having a printed surface and at least one electroluminescent element embedded within the printed surface and a substrate layer or coupled between the printed surface and the substrate layer, and a rigid backing substrate. Also, an illuminated signage system having a non-opaque material with an etched portion that diffuses light from a light source adjacent to the non-opaque material and a printed layer having indicia visible through the non-opaque material. Also, a method of forming an illuminated signage system, the method including providing a printed surface, coupling the printed surface to a substrate layer, and embedding an electroluminescent element through the printed surface and into at least the substrate layer.

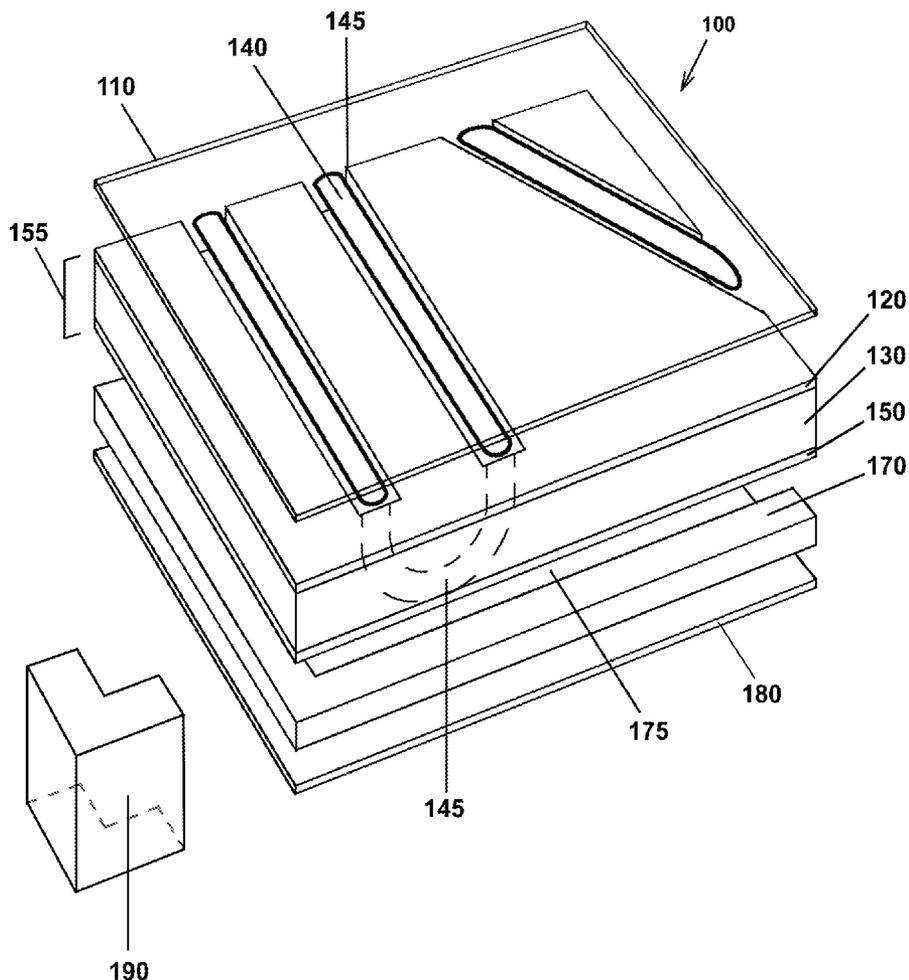
(22) Filed: **Aug. 3, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/379,673, filed on Sep. 2, 2010.

Publication Classification

(51) **Int. Cl.**
G09F 13/22 (2006.01)
B32B 37/12 (2006.01)



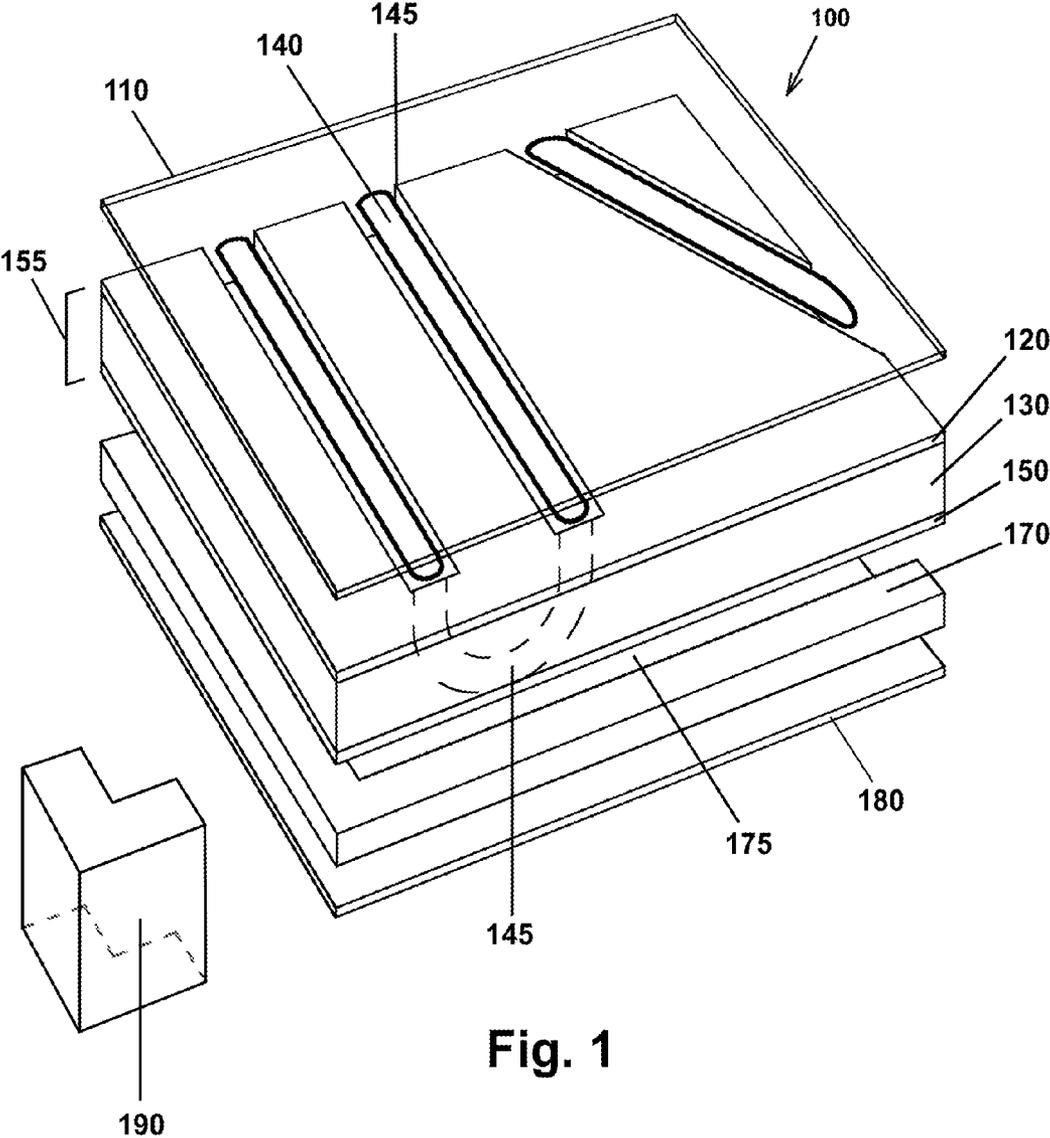


Fig. 1

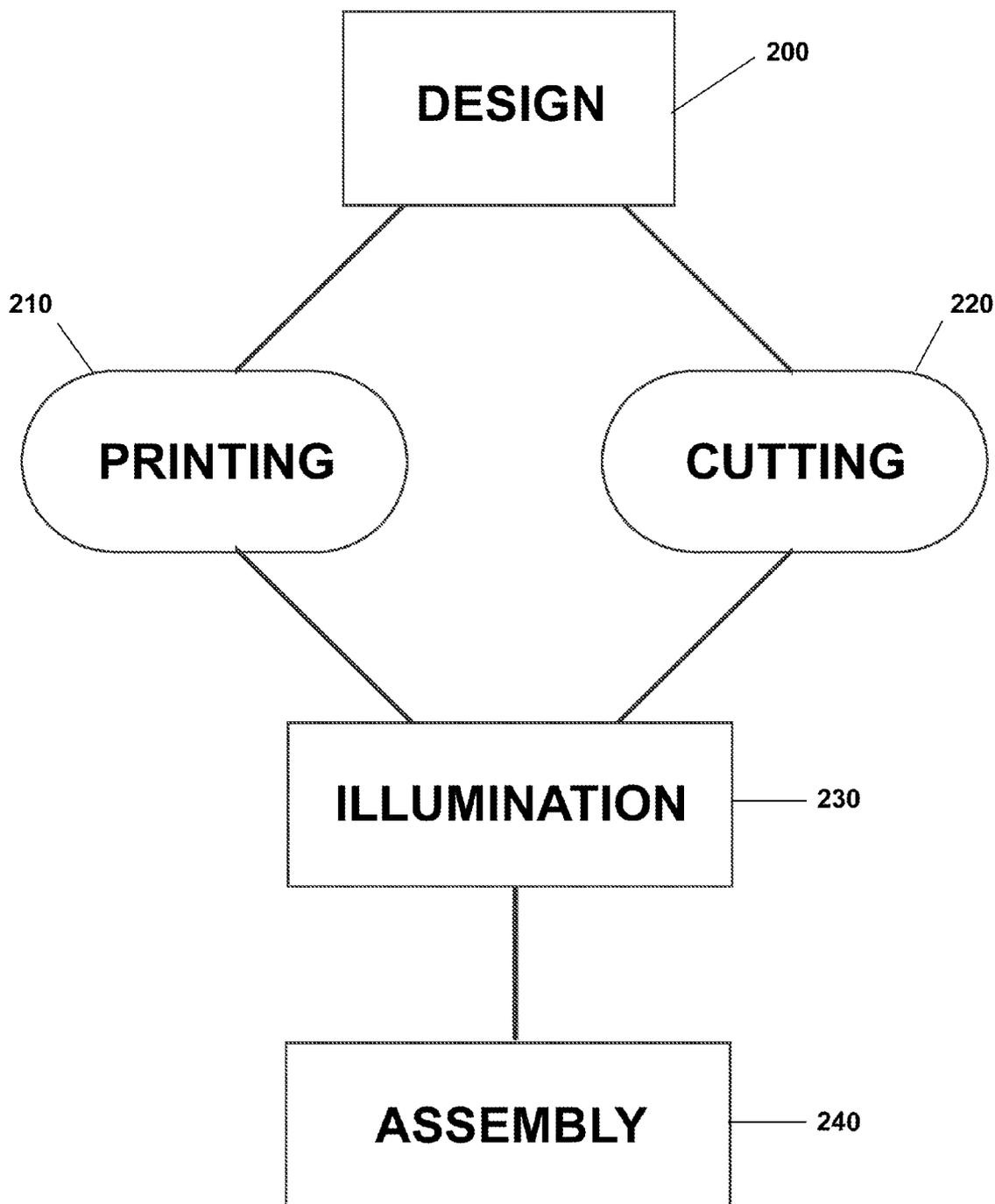


Fig. 2

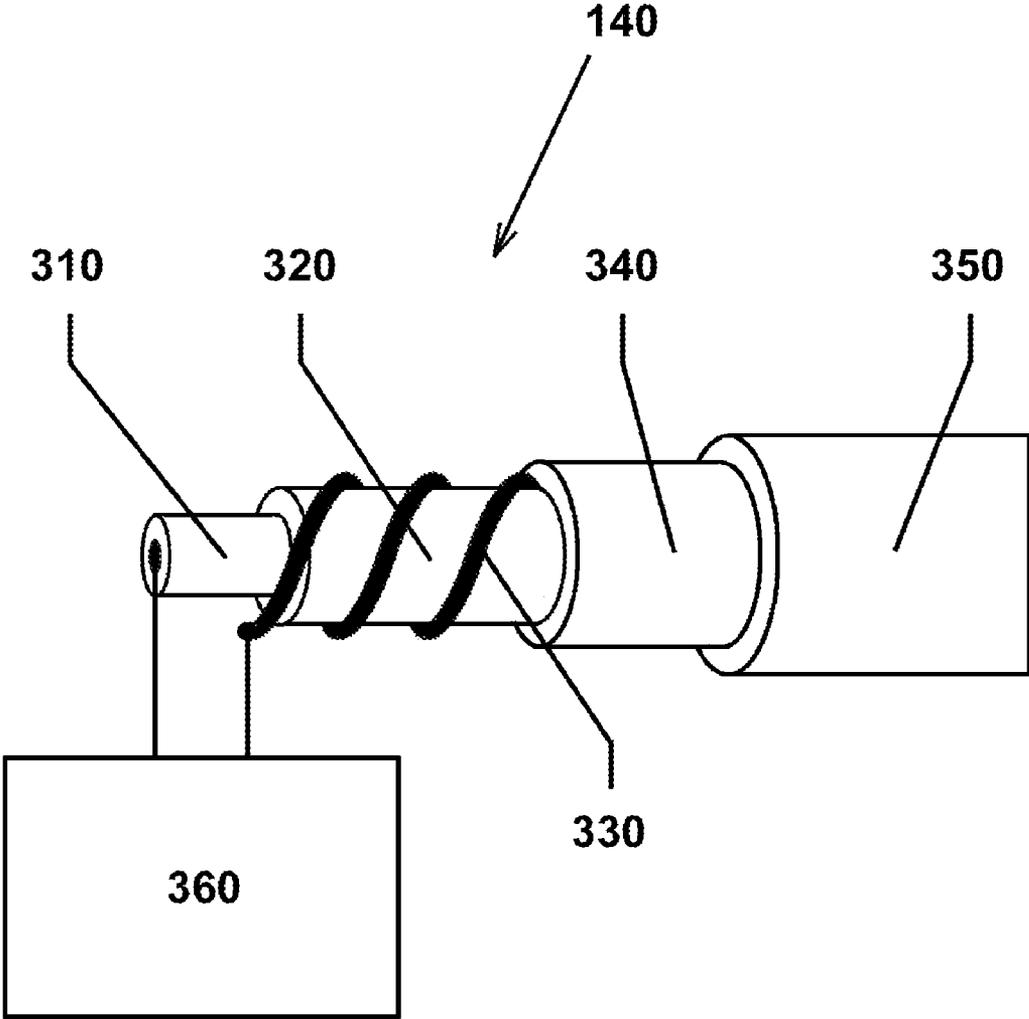


Fig. 3
Prior Art

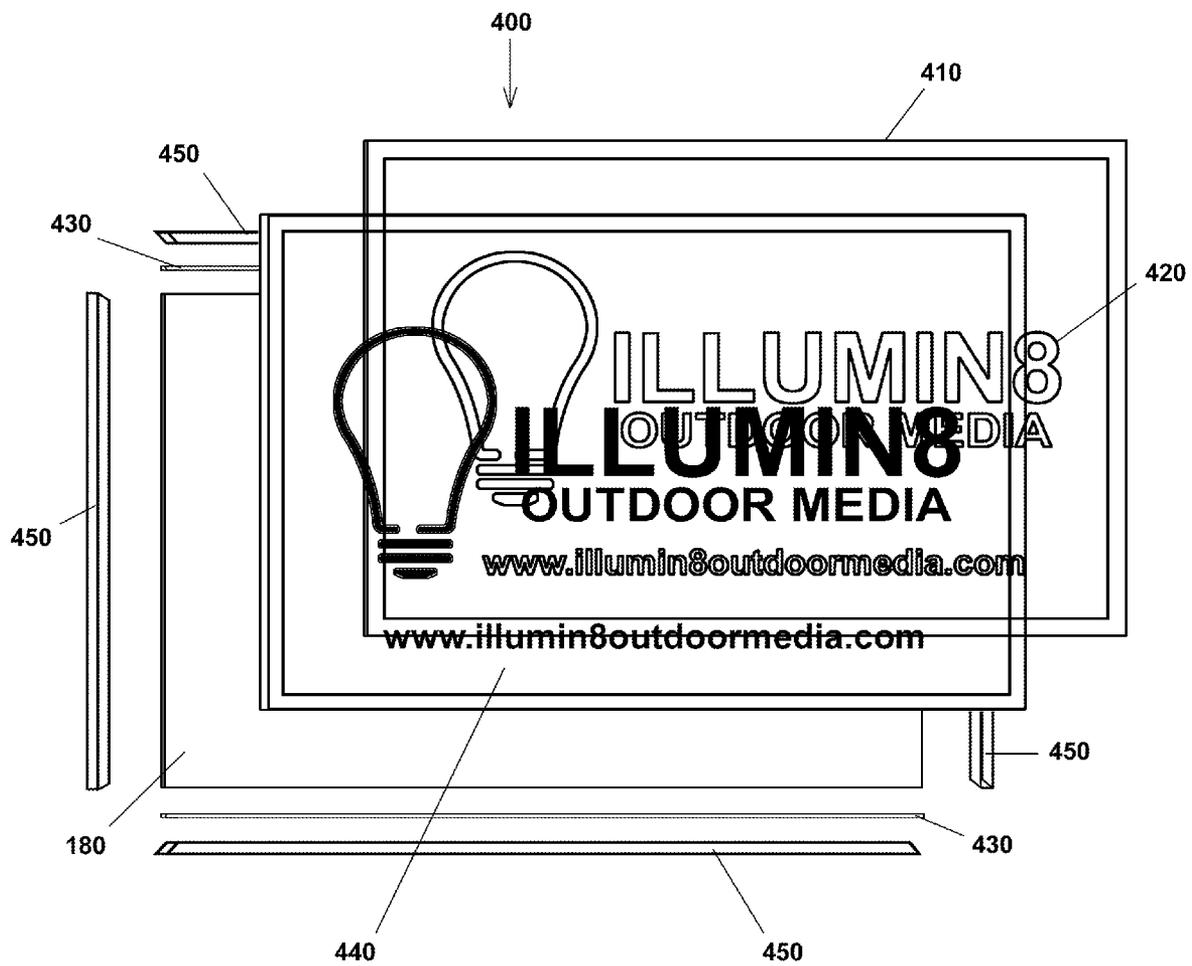


Fig. 4

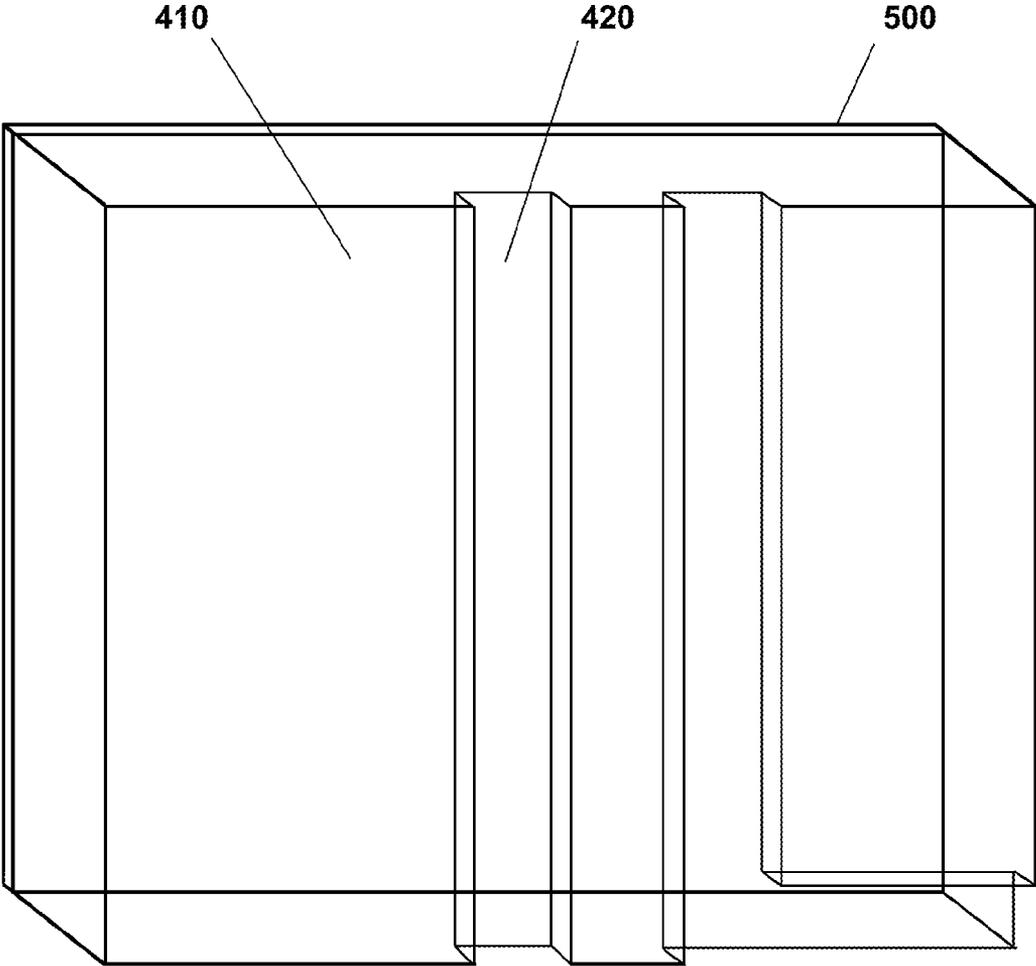


Fig. 5

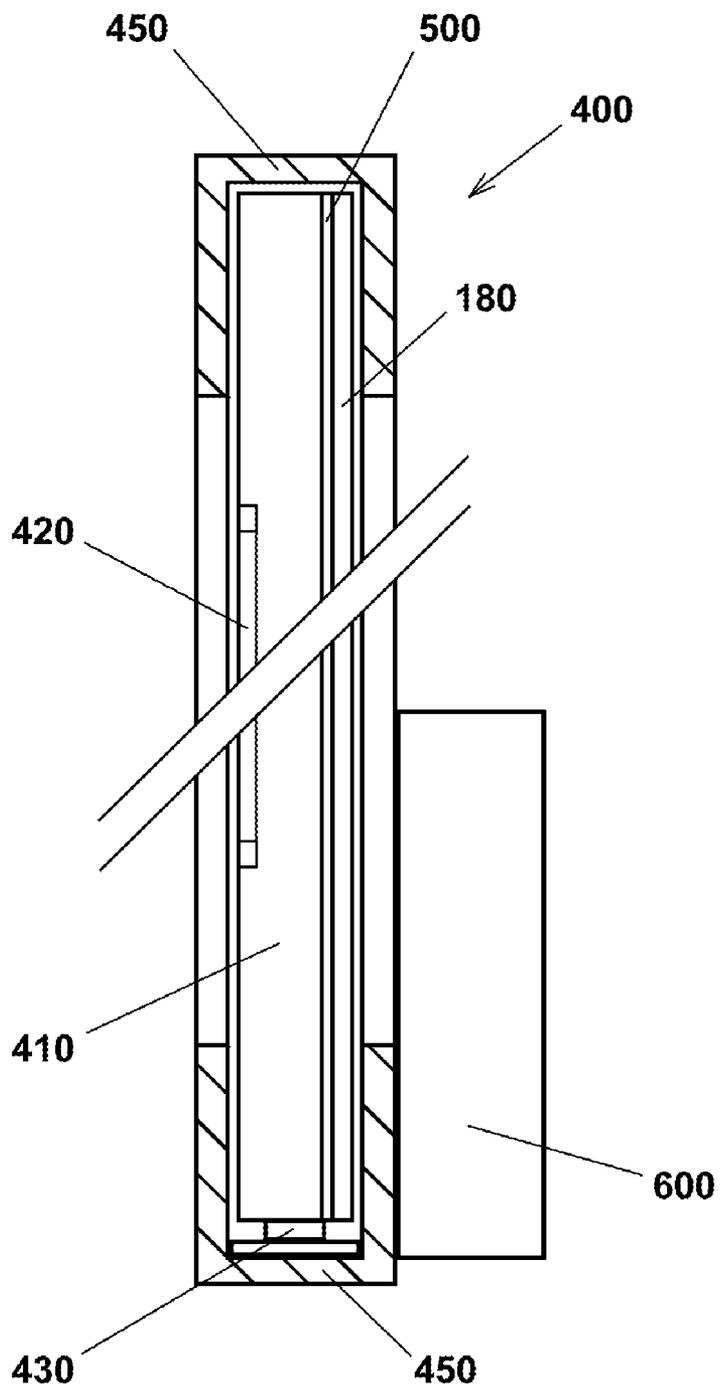


Fig. 6

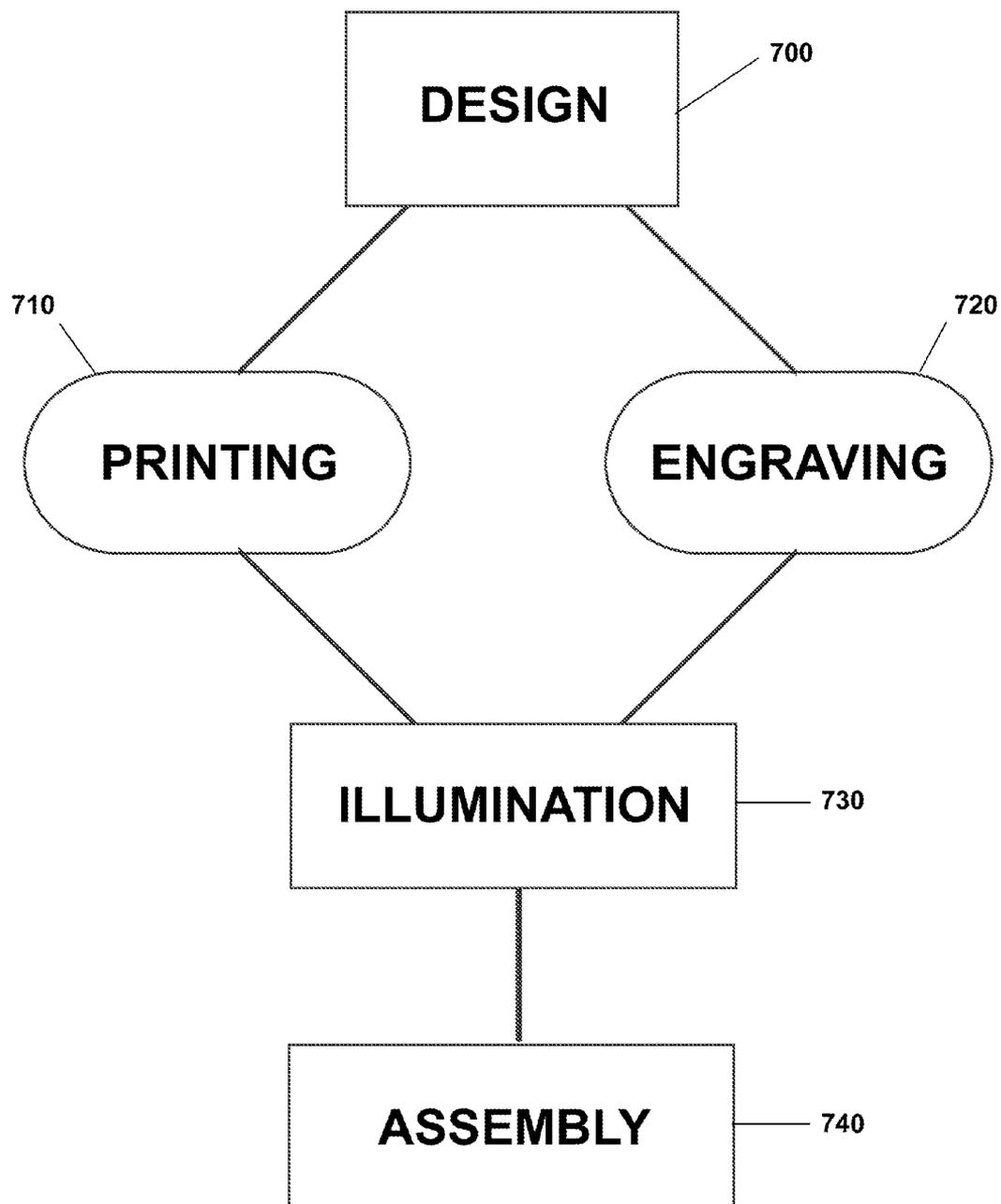


Fig. 7

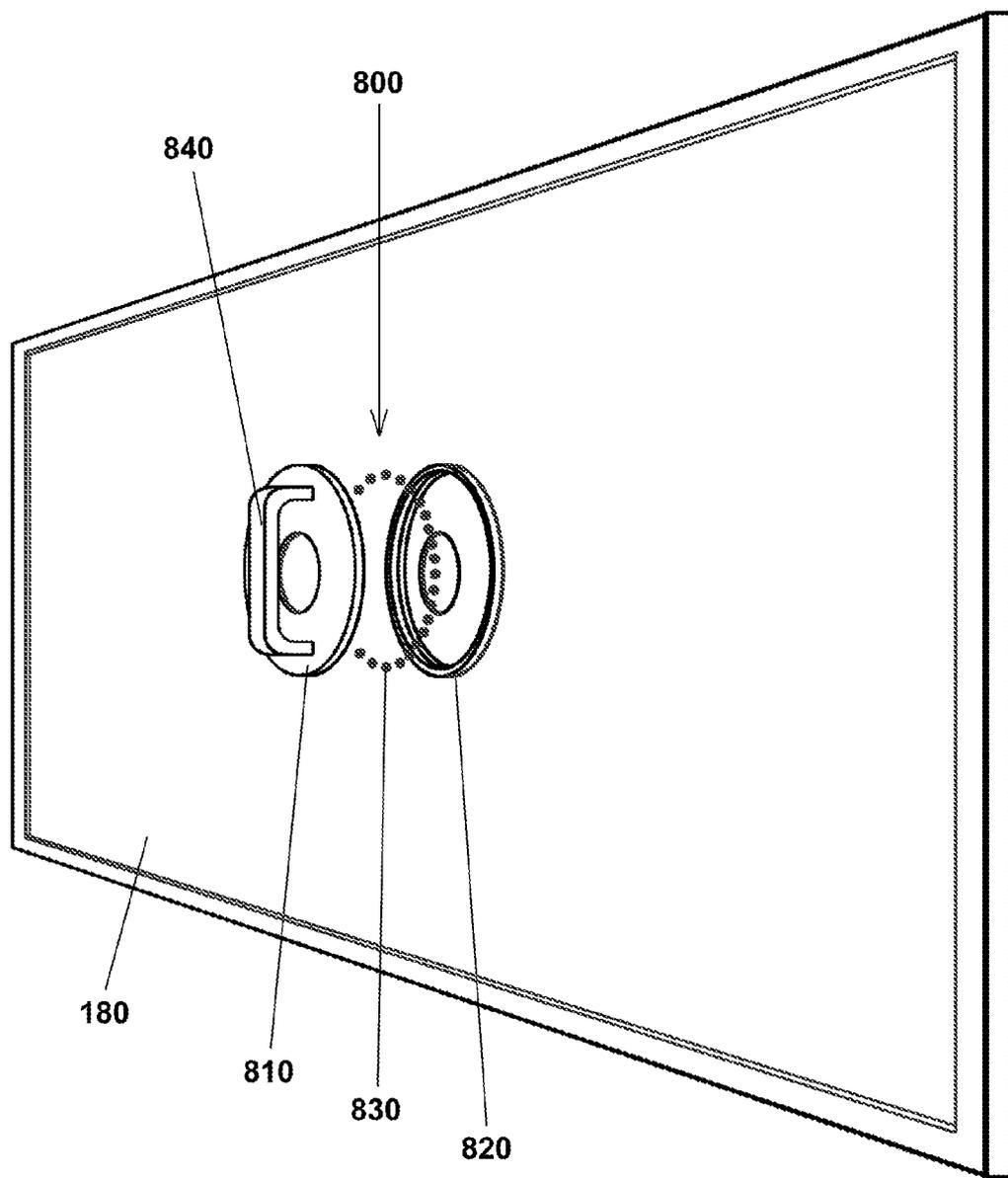


Fig. 8

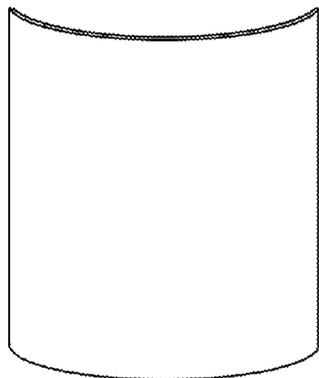


Fig. 9

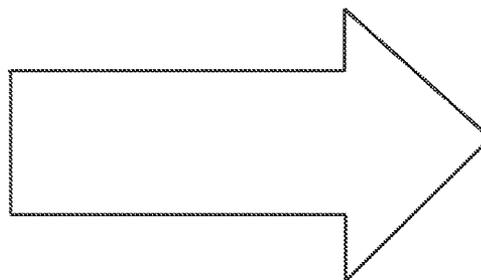


Fig. 10

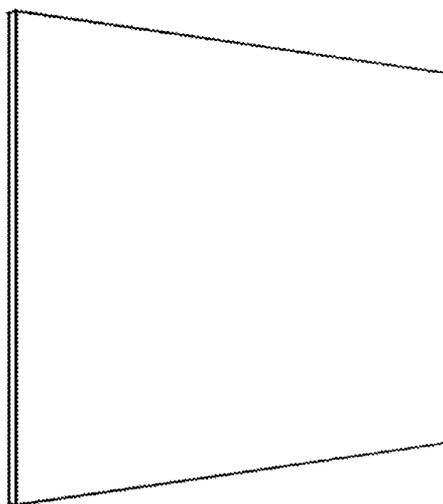


Fig. 11



Fig. 12

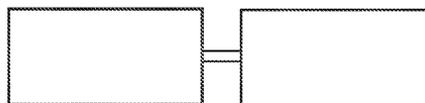


Fig. 13

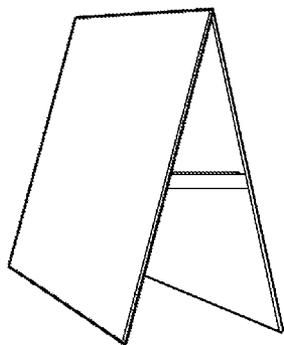


Fig. 14

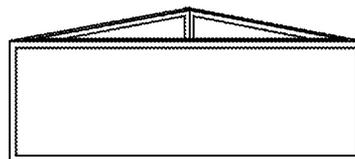


Fig. 15

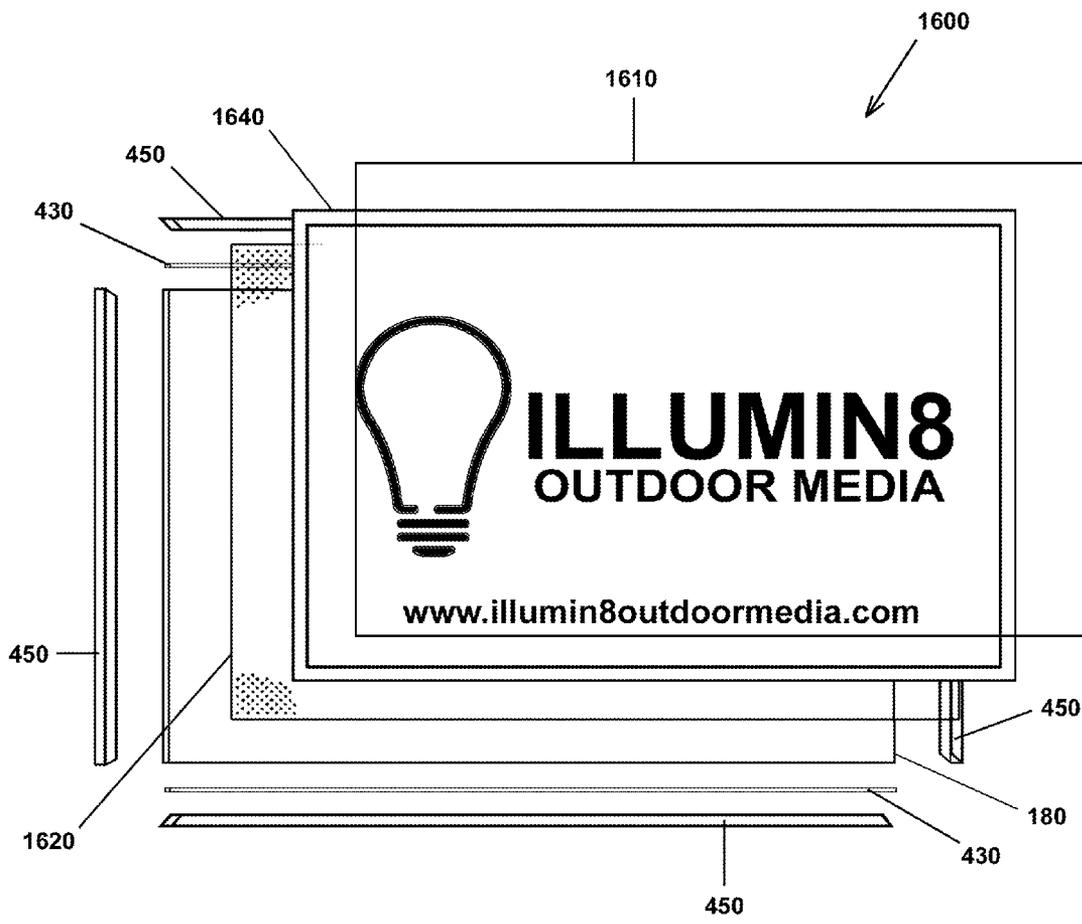


Fig. 16

SYSTEMS AND METHOD FOR OUTDOOR MEDIA SIGNAGE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Provisional Application 61/379,673, filed on Aug. 4, 2010, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present disclosure relates to illuminated signage systems, and more particularly to illuminated signage systems having etched non-opaque materials for refracting light and/or electroluminescent wire.

[0004] 2. Description of Related Art

[0005] Presentation of important information, such as advertisements, directions, or decorative art often relies on non-illuminated displays which can be difficult to read or view in low-light situations or can be visually overpowered by surrounding displays of a similar type or by busy backgrounds that tend to camouflage the intended message. To combat these and other problems, illuminated signage systems have been developed.

[0006] Some examples of illuminated signage systems include neon lighting, traditional backlit signs, and front-lit signs. Still others have conceived of using etched non-opaque materials which are lit from an edge to refract light at strategic points to develop an image. Further, some have used electroluminescent (EL) wire to create images on a surface. The current state of the art has several shortcomings. First, in signs using EL wire, the displays are difficult to make portable and often rely on a formation of the EL wire that causes lines to be continuous, adding visual clutter to a display. The current EL wire signs also suffer from structural qualities that make them difficult to manufacture and therefore, more expensive. In signs using etched non-opaque materials, the prior art does not account for a desire to change background images easily. Alternatively, the prior art does not provide an easily manufactured edge-lit sign having a printed layer showing through the non-opaque material to present a display in conjunction with an etched portion of the non-opaque material. In prior art signs using etched non-opaque materials or EL wire, the finished products are not very portable for some applications, such as roadside handheld spinning by advertisers, or for use as a cheer display in a cheerleading squad or by fans of a sport or event.

[0007] So as to reduce the complexity and length of the Detailed Specification, and to fully establish the state of the art in certain areas of technology, Applicant(s) herein expressly incorporate(s) by reference all of the following materials identified in each numbered paragraph below.

[0008] U.S. Pat. No. 3,052,812 discloses a flexible electroluminescent strand. The strand comprises two conductors separated by an electroluminescent phosphor. A varying voltage applied across the two conductors excites the phosphor so that it produces light.

[0009] U.S. Patent Application Publication 2010/0123385 teaches electroluminescent fibers that include two electrical conductors embedded in a matrix of a polymer having phosphor particles, which are excited to emit light when electrical

power is applied to the conductors. The fibers are meant to be flexible, washable, and able to be integrated into fabrics using textile equipment.

[0010] U.S. Patent Application Publication 2008/0036375 and U.S. Pat. Nos. 3,069,579 and 7,737,633 disclose alternative electroluminescent wires.

[0011] U.S. Patent Application Publication 2006/0042137 discloses glowing signs formed from electroluminescent wire which is bent into shapes. To create gaps in the lit electroluminescent wire patterns, a dark paint or other suitable material is used to cover the wire and block its light in the appropriate areas.

[0012] U.S. Pat. No. 7,048,400 discloses illuminated systems capable of use as an advertising medium.

[0013] The invention may use energy from a solar photocell to power a light emitting device, which could be a film-like component printed onto a substrate. The EL device is formed from layering the components of the EL device onto a substrate.

[0014] U.S. Pat. No. 4,999,936 discloses an illuminated sign that uses an electroluminescent panel covered by a stencil with an image cut out to allow the desired light pattern to project through to convey the image.

[0015] U.S. Pat. Nos. 6,203,391 and 6,965,196 disclose electroluminescent signs having lighted portions made by screen printing the layers of the electroluminescent lamp onto the sign, with an illuminating phosphor layer being printed in the shape of the desired image.

[0016] U.S. Patent Application Publication 2007/0210992 discloses an EL wire display having an array of pegs that can accommodate individual segments of EL wire routed around the display in a desired pattern. This display is disclosed as self-contained and portable.

[0017] U.S. Pat. No. 5,276,591 discloses an edge-lit translucent panel for even illumination of the entire surface of the panel, which has a graphic applied by painting, silk screening, or etching. The etching reflects light from within the panel, and in another embodiment, painted graphics in optical contact with the surface of the panel are illuminated by the light from within the panel.

[0018] U.S. Pat. Nos. 6,481,131 and 7,681,347 are examples of edge-lit translucent panels with an etched or inscribed design such that light entering from the side of the panel strikes the etching to be reflected outwardly to a viewer.

[0019] U.S. Pat. No. 5,433,024 discloses an edge-lit display comprising a tapered transparent plate with a piece of advertising applied to a surface of the plate. Lamps at the edge of the tapered plate provide light into the plate, whereby the tapered nature of the plate causes light to reflect within the plate and provide illumination for the advertising.

[0020] U.S. Pat. No. 6,705,033 discloses an edge-lit sign having an acrylic sheet which is etched around fluorescent letters applied to the acrylic sheet, such that light transmitted into the acrylic sheet is refracted to exit the etched area to illuminate the boundary of the fluorescent letters.

[0021] U.S. Pat. No. 6,076,294 discloses an illuminated sign having a photoconductive plate which is inset from a back face of the plate to define indicia. Except for the areas defined by the indicia, the photoconductive plate is covered by an opaque material opposite the front viewing side. The areas defined by the indicia are covered by a fluorescent material opposite the front viewing side. The plate is lit from an edge such that the light impinges on the boundaries of the

indicia to cause the indicia to illuminate in low-light conditions, while the fluorescent material renders the indicia visible during daylight hours.

[0022] Applicant(s) believe(s) that the material incorporated above is “non-essential” in accordance with 37 CFR 1.57, because it is referred to for purposes of indicating the background of the invention or illustrating the state of the art. However, if the Examiner believes that any of the above-incorporated material constitutes “essential material” within the meaning of 37 CFR 1.57(c)(1)-(3), applicant(s) will amend the specification to expressly recite the essential material that is incorporated by reference as allowed by the applicable rules.

BRIEF SUMMARY OF THE INVENTION

[0023] The present invention provides among other things an illuminated signage system. Particular implementations may further comprise any of the following aspects. In one embodiment, the system includes a printed surface coupled to a first side of a substrate layer. An adhesive sheet is coupled to an opposite side of the substrate layer. A rigid backing substrate is coupled to the adhesive sheet, and at least one electroluminescent element is embedded within the printed surface and the substrate layer. An electroluminescent element may be coupled between the printed surface and the substrate layer.

[0024] In one embodiment, the electroluminescent element is embedded through the adhesive sheet.

[0025] In one embodiment, there is a spacing layer coupled between the adhesive sheet and the rigid backing substrate such that the electroluminescent element also passes within the spacing layer.

[0026] In one embodiment, there is a power source. The power source may be a transformer configured to be powered by an electrical outlet. The power source may be portable. The power source may have at least one battery. The power source may have at least one solar cell.

[0027] In one embodiment, the electroluminescent element forms a lighted image of a symbol, text, or number, or a combination of these.

[0028] In one embodiment, there is a spinning device configured to rotate the illuminated signage system. The spinning device may comprise a turntable and contain a portable power source configured to supply power to the electroluminescent element.

[0029] In one embodiment, there is a non-opaque top layer coupled to the printed surface.

[0030] In one embodiment, there is at least one corner protector.

[0031] In one embodiment, the electroluminescent element is a wire, sheet, or ribbon.

[0032] In one embodiment, the electroluminescent element is woven in and out of the printed surface such that the electroluminescent element appears discontinuous on the printed surface.

[0033] In another embodiment, the present invention provides an illuminated signage system having a non-opaque material with an etched portion that diffuses light from a light source adjacent to the non-opaque material. The system has a printed layer with indicia thereon, the indicia being visible through the non-opaque material. The printed layer is coupled to the non-opaque material. There is a power source supplying power to the light source.

[0034] In one embodiment, the printed layer is a printed sheet repeatedly separable from the non-opaque material.

[0035] In one embodiment, the printed layer is coupled to a rigid backing substrate. There may be a spinning device coupled to the rigid backing substrate. The spinning device is configured to rotate or permit rotation of the illuminated signage system. The spinning device may contain the power source.

[0036] In one embodiment, there may be a protective border. The protective border may shroud the light source.

[0037] In one embodiment, the light source is a light-emitting diode.

[0038] In one embodiment, the non-opaque material is a sheet of acrylic, glass, or polycarbonate.

[0039] In one embodiment, the etched portion is a surface of the non-opaque material and is adjacent to the printed layer.

[0040] In one embodiment, the etched portion is internal to the non-opaque material.

[0041] In another embodiment, the present invention provides a method of forming an illuminated signage system. The method includes providing a printed surface, coupling the printed surface to a first side of a substrate layer, providing an adhesive sheet, coupling the adhesive sheet to an opposite side of the substrate layer, providing a rigid backing substrate, and coupling the rigid backing substrate to the adhesive layer. The method further includes providing an electroluminescent element and embedding the electroluminescent element through the printed surface such that the electroluminescent element protrudes into at least the substrate layer, the adhesive sheet, or the spacing layer. The method further includes connecting the electroluminescent element to a power source.

[0042] In another embodiment, the present invention provides an illuminated signage system having a non-opaque material, a diffuser sheet that diffuses light from a light source adjacent to the diffuser sheet, and a transparent layer having indicia thereon. The indicia may be formed by preventing or permitting areas of light from the diffuser sheet to pass through. The indicia may be positioned to be visible through the non-opaque material. The printed layer may be coupled to the non-opaque material. A power source may supply power to the light source.

[0043] Aspects and applications of the invention presented here are described below in the drawings and detailed description of the invention. Unless specifically noted, it is intended that the words and phrases in the specification and the claims be given their plain, ordinary, and accustomed meaning to those of ordinary skill in the applicable arts. The inventors are fully aware that they can be their own lexicographers if desired. The inventors expressly elect, as their own lexicographers, to use only the plain and ordinary meaning of terms in the specification and claims unless they clearly state otherwise and then further, expressly set forth the “special” definition of that term and explain how it differs from the plain and ordinary meaning. Absent such clear statements of intent to apply a “special” definition, it is the inventors’ intent and desire that the simple, plain and ordinary meaning to the terms be applied to the interpretation of the specification and claims.

[0044] The inventors are also aware of the normal precepts of English grammar. Thus, if a noun, term, or phrase is intended to be further characterized, specified, or narrowed in some way, then such noun, term, or phrase will expressly include additional adjectives, descriptive terms, or other

modifiers in accordance with the normal precepts of English grammar. Absent the use of such adjectives, descriptive terms, or modifiers, it is the intent that such nouns, terms, or phrases be given their plain, and ordinary English meaning to those skilled in the applicable arts as set forth above.

[0045] Further, the inventors are fully informed of the standards and application of the special provisions of 35 U.S.C. §112, ¶ 6. Thus, the use of the words “function,” “means” or “step” in the Detailed Description or Description of the Drawings or claims is not intended to somehow indicate a desire to invoke the special provisions of 35 U.S.C. §112, ¶ 6, to define the invention. To the contrary, if the provisions of 35 U.S.C. §112, ¶ 6 are sought to be invoked to define the inventions, the claims will specifically and expressly state the exact phrases “means for” or “step for, and will also recite the word “function” (i.e., will state “means for performing the function of [insert function]”), without also reciting in such phrases any structure, material or act in support of the function. Thus, even when the claims recite a “means for performing the function of . . .” or “step for performing the function of . . .” if the claims also recite any structure, material or acts in support of that means or step, or that perform the recited function, then it is the clear intention of the inventors not to invoke the provisions of 35 U.S.C. §112, ¶ 6. Moreover, even if the provisions of 35 U.S.C. §112, ¶ 6 are invoked to define the claimed inventions, it is intended that the inventions not be limited only to the specific structure, material or acts that are described in the preferred embodiments, but in addition, include any and all structures, materials or acts that perform the claimed function as described in alternative embodiments or forms of the invention, or that are well known present or later-developed, equivalent structures, material or acts for performing the claimed function.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0046] A more complete understanding of the present invention may be derived by referring to the detailed description when considered in connection with the following illustrative figures. In the figures, like reference numbers refer to like elements or acts throughout the figures.

[0047] FIG. 1 depicts an exploded view of an EL Element embodiment of the invention.

[0048] FIG. 2 depicts a flowchart of production of an EL Element embodiment of the invention.

[0049] FIG. 3 depicts an implementation of an EL Element.

[0050] FIG. 4 depicts an exploded view of an etched non-opaque material embodiment of the invention.

[0051] FIG. 5 depicts an implementation of an etched non-opaque material used in an embodiment of the invention.

[0052] FIG. 6 depicts a side cutaway view of an implementation of an etched non-opaque material embodiment of the invention.

[0053] FIG. 7 depicts a flowchart of production of an etched non-opaque material embodiment of the invention.

[0054] FIG. 8 depicts a spinning device attached to the rear of a handheld signage product.

[0055] FIGS. 9-15 depict examples of various alternative shapes for signage product implementations of the invention.

[0056] FIG. 16 depicts a diffuser material embodiment of the invention.

[0057] Elements and acts in the figures are illustrated for simplicity and have not necessarily been rendered according to any particular sequence or embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0058] In the following description, and for the purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the various aspects of the invention. It will be understood, however, by those skilled in the relevant arts, that the present invention may be practiced without these specific details. In other instances, known structures and devices are shown or discussed more generally in order to avoid obscuring the invention. In many cases, a description of the operation is sufficient to enable one to implement the various forms of the invention, particularly when the operation is to be implemented in software. It should be noted that there are many different and alternative configurations, devices and technologies to which the disclosed inventions may be applied. The full scope of the inventions is not limited to the examples that are described below.

[0059] The present invention provides among other things outdoor media signage products that allow for a message or advertisement to be displayed both day and night. Daytime viewing may be accomplished through the use of full color printed graphics which display a message or advertisement in a well lit environment, much like traditional signage. However, as lighting in the environment diminishes, the sign is able to be “switched on” in which an embedded electroluminescent wire, sheet, or ribbon lighting becomes apparent. Alternatively, an etched non-opaque material may be lit from an edge. The switching on of the invention can be accomplished by a standard electrical switch, a photovoltaic sensor to sense when lighting conditions are dim enough to justify activating the sign lighting, or other switching mechanism known to one of ordinary skill in the art. The lighting used in the invention, including electroluminescent elements and light emitting diodes, are very efficient and therefore it is possible to run these signs on portable power sources such as traditional batteries, rechargeable battery sources, and even solar power cells. This allows for the signage to be illuminated while remaining stationary or fully portable, such as for use in a handheld roadside spinning advertisement often used to attract customers in a dynamic way, or for use as a cheer or motivational tool.

[0060] In some embodiments of the invention, a sign may have a solar cell for sunlight to be gathered during the daytime advertising hours to charge one or more rechargeable batteries acting as the power source for the sign when it is switched on later, either manually or automatically with the use of a photovoltaic sensor. Alternatively, some embodiments may use standard store-bought batteries. In yet another embodiment, a sign may use a transformer powered by a standard 120v electrical socket.

[0061] Because of the rechargeable and solar features or battery powered features, the applications of this invention are widespread. The primary use of these signs may be to showcase sponsor, business, client, or promotional messages or advertisements in a way that attracts attention to either purchase, attract potential clients, entertain, or inform in various lighting conditions. The use of such signage, however, would be understood by those having ordinary skill in the art as not being limited as such.

[0062] Electroluminescent Element Signage:

[0063] In one application of the invention, and as shown below in FIG. 1, the outdoor media signage product **100** is comprised of various layers. While not limited as such, in one embodiment of the invention, the optional top layer **110** may be comprised of a protective laminate or acrylic sheet to protect against weathering or to protect the other layers from handling. Another layer may be a printed surface **120** of printed paper, photo paper, cardboard, card stock, thin plastic, fabric, vinyl, or other material known in the art which displays the desired graphic in standard daytime or lighted indoor use. Another layer may be a substrate layer **130** which may be a matte board or foam board or other material that acts as the channeling housing for the electroluminescent element, wire, sheet, or ribbon ("EL Element" **140**). The printed surface **120** and the substrate layer **130** may be adhered together with adhesive. Another layer may be a single sided adhesive sheet **150** attached to the substrate layer **130**. This adhesive sheet keeps all of the cut pieces of substrate **130** and printed surface **120** in place to facilitate weaving of the EL Element **140** in and out of the printed surface **120** to achieve a discontinuous lighting effect when viewed by an observer. Another layer may be the spacing layer **170**, which acts as a spacer to permit the EL Element **140** to have clearance when it is woven in and out of the substrate layer **130** and the printed surface **120** (in situations when weaving extends beyond substrate layer **130** and adhesive sheet **150**). Another layer may be the rigid backing substrate **180**, which may provide the majority of sign's rigidity and can be made out of any suitable material, including but not limited to gator board, plastic backing (for instance, sold under the trademark COROPLAST), or molded plastic. Corner protectors **190** may also be applied to hold the sign together securely along with adhesives between each of the layers.

[0064] In some applications of the invention, the printed surface **120** displays the message or graphic during the times when lighting is not necessary due to the sun or other forms of external light sources. Graphics are typically provided by the individual requesting that a sign be made or they may be created in-house. The graphics may be printed using a large format printer onto the printed surface **120**.

[0065] A typical non-cursive word or shape requires that there be spacing between the presented letters or shapes. In some embodiments of this invention, an illuminated non-cursive word or shape may be created using a single strand of EL Element. In order to give the appearance that each of the characters is separate, the signage may incorporate a weaving or routing technique. Channels **145** are cut into the printed surface **120** and the substrate layer **130** to allow the EL Element **140** to be guided through desired areas of the sign. The EL Element **140** is laid into the assembly **155** comprised of the printed surface **120**, the substrate layer **130**, and the adhesive sheet **150**. The EL Element **140** is bent and formed through the channels **145** to create a border of the desired letter or shape. When the letter or shape is outlined with the EL Element **140** and a discontinuity in the image is desired, the EL Element **140** is pushed beneath the printed surface **120**, through the substrate layer **130** and, if necessary or desired, through the adhesive sheet **150**, and then brought back through to the printed surface **120** to the next of the channels **145**. Alternative embodiments using thicker substrate layers **130** may not require that the EL Element **140** go all the way through the substrate layer **130**, as in those embodiments the thicker substrate may accommodate the

routing of the EL Element **140** without the need for penetrating the adhesive sheet **150**. This weaving process allows for the letters and/or shapes to appear as individual characters rather than appearing connected to each other. If the substrate layer **130** is not sufficiently thick to accommodate the EL Element **140** without penetrating the adhesive sheet **150**, there may be a need for clearance space **175** between the substrate layer **130** and rigid backing substrate **180**. This may be created with the spacing layer **170**, which may be of a frame configuration or other configuration with internal clearance space **175** to accommodate the EL Element **140**. Having the EL Element **140** woven behind the printed surface **120** results in a viewer only observing desired lit areas. To ensure that cut pieces of the printed surface **120** and substrate layer **130** remain in place, the adhesive sheet **150** may be used. The width of channels **145** is respective to the dimensions of the EL Element **140** that will be used as the border lighting or inlay lighting.

[0066] Referring in part to FIG. 1 and FIG. 2, the desired image may be created in or uploaded to a computer and the sizing and resolution may be adjusted for the dimensions of the sign as part of the design process **200**. The image may be traced using drafting software which outlines or inlines the design with guidelines where the cuts for channels **145** will be made. The channels **145** for the placement of the EL Element **140** may be cut into the printed surface **120** as well as the substrate layer **130**. This cutting may be performed with a computerized system accompanied by a cutting or engraving mechanism (such as a CNC milling machine, laser cutter, matte board cutter, etc.). The channels **145** may be cut at the same time printed surface **120** is printed, as shown in printing process **210** and cutting process **220**. This process may use other methods of printing and cutting known to those of ordinary skill in the art. Illumination **230** comprises weaving the EL Element **140** through channels **145**, and Assembly **240** includes attaching all included layers together to create the final signage product **100**.

[0067] In other embodiments, a lighting effect can be produced by incorporating an electroluminescent sheet or ribbon directly behind the cut printed surface **120**. In these embodiments, entire letters or images on the sign can be illuminated, or backlighting can be provided for photographic transparencies.

[0068] Referring now to FIG. 3, the EL Element **140** is commonly known at least in one possible configuration as a thin copper core **310** coated in a phosphor casing **320** which glows upon application of alternating current. Examples of EL Elements **140** and similar substitutes are provided above in the Description of the Related Art, as EL Elements are well known in the art.

[0069] In a wire or tubular form, the EL Element **140** includes a solid copper wire core **310** coated in phosphor **320**. A fine copper wire **330** is wound around the coated core **310** in a helical or spiral pattern. The fine wire **330** is electrically isolated from the copper core. On the outside of the copper core, phosphor, and fine wire is a clear protective sleeve **340**. A clear or colored outer sleeve **350** surrounds sleeve **340**. An electric potential from a resonant oscillator **360** of approximately 90-120 volts at about 1000 Hz is applied between the copper core wire **310** and the fine wire **330**, however, one of ordinary skill in the art would recognize that any appropriate voltage or frequency may also be used. The EL Element **140** can be modeled as a coaxial capacitor with about 1 nF of capacitance per foot, however this disclosure is not intended

to be limited to such a capacitance. The rapid charging and discharging of this capacitor excites the phosphor to emit light. The colors of light that can be produced efficiently by phosphors are limited, so many types of wire may use an additional fluorescent organic dye in the sleeve 350 to produce the final result. These organic dyes produce colors like red and purple when combined with the bluegreen light of the wire-wrapped, phosphor covered core 310, 320, 330. A resonant oscillator 360 is typically used to generate the high voltage drive signal. Because of the capacitance load of the EL Element 140, using an inductive (coiled) transformer makes the driver a tuned LC oscillator; therefore it is very efficient. The efficiency of the EL Element 140 is very high, so a few hundred feet of EL wire can be powered by AA batteries for several hours.

[0070] In some embodiments of the invention, the EL Element 140 receives its power through the use of an inverter which converts standard voltage produced from store bought batteries, rechargeable batteries, and from solar cells into the correct frequency required to power the EL Element 140. The use of a single inverter allows for multiple color strands of EL elements to be used, allowing for full customization in a sign. In one embodiment, the inverter may include a sequencer effect which allows specific portions of the signage to light up at different times to provide a unique eye-catching effect.

[0071] Etched non-opaque display:

[0072] Referring now to FIG. 4, another embodiment of an illuminated signage system may comprise a non-opaque material 410 having an etched portion 420 (see FIG. 5) which is provided with edge lighting light source 430 (see FIG. 6) so that the light enters the non-opaque material 410 and becomes refracted by the etched portion 420 so that the etched portion 420 is visible to a viewer. The non-opaque material 410 may be formed of, for example, acrylic, polycarbonate, or glass. Other suitable materials are known to those of ordinary skill in the art. The non-opaque material 410 may be etched using a CNC or laser system to create surfaces upon which the light reflects or scatters to display key components of an image, message, graphic, symbol, or advertisement. As a result of the etching in the non-opaque material 410, the image appears to float in the center of the signage product when the light source is powered on.

[0073] A printed layer in the form of printed sheet 440 may be coupled behind the non-opaque material 410 to display a message or graphic during the times when lighting is not necessary due to sun or other forms of external light sources, or during times when the edge lighting is powered to provide a combined image effect. The printed sheet 440 may be adhered to the non-opaque material 410 or a sign assembly 400 can be made by layering the etched non-opaque material 410, the printed backing or sheet 440, and a rigid backing substrate 180, all held together with stand-off screws, corner protectors 190 in FIG. 1, or other fastening devices known in the art. In some embodiments, the printed sheet 440 may be printed paper, cardboard, card stock, thin plastic, fabric, vinyl, or other printable or display media known to one of ordinary skill in the art.

[0074] Alternatively, instead of using a separate printed sheet 440, an embodiment may include printing directly onto the non-opaque material 410 using screen-printing, ink jet printing, or other known printing methods. This is shown in FIG. 5, which depicts an embodiment in which the printed layer is in the form of print 500. Regardless of the medium,

the etched or printed indicia may be an image, message, graphic, symbol, or advertisement.

[0075] A rigid backing substrate 180 may be coupled behind the printed sheet 440 or the printed non-opaque etched material 410 to provide structural rigidity or a mounting point for a spinning device 800 (FIG. 8).

[0076] Referring now to FIG. 6, sign assembly 400 may also have a protective border 450 to protect from impact. The border may be foam, rubber, plastic tubing, u-channeling, or another known suitable material. In some embodiments of the invention, the light source 430 is held within the border 450 to provide light to at least one side of the non-opaque material. In other embodiments of the invention, the light source is adhesively coupled to an edge of the non-opaque material 410 such that the light source 430 provides lighting to the non-opaque material 410 from at least one side, while the protective border 450 shrouds the edge of the non-opaque material and the light source 430. A power source 600 may be mounted on or within the border, or alternatively, within a spinning device similar to spinning device 800 in FIG. 8.

[0077] The light source 430 can be provided by, for example, one or more light emitting diodes, incandescent bulbs, or other known sources capable of injecting light into one or more edges of the non-opaque material 410.

[0078] Referring now to FIG. 7, the desired image may be created in or uploaded to a computer and the sizing and resolution may be adjusted for the dimensions of the sign as part of design process 700. The image may be etched using drafting software which outlines or inlines the design with guidelines where the cuts for etched portion 420 will be made. This etching may be performed with a computerized system accompanied by a cutting or engraving mechanism (such as a CNC milling machine, laser cutter, etc.). The etched portion 420 may be cut or engraved at the same time printed layer 440 or 500 are printed, as shown in printing process 710 and engraving process 720. Other methods of printing and cutting known to those of ordinary skill in the art may also be used. Illumination 730 may comprise attaching light source 430 to etched material 410. Assembly 740 includes attaching all included layers together to create the final signage product 400.

[0079] Non-opaque display with edge-lit diffuser material:

[0080] Referring now to FIG. 16, another edge-lit embodiment is shown. Like signage product 400 in

[0081] FIG. 4, signage 1600 uses edge lighting. This embodiment may comprise a non-opaque material 1610. The non-opaque material 1610 may be formed of, for example, acrylic, polycarbonate, or glass. Other suitable materials are known to those of ordinary skill in the art. The non-opaque material 1610 may cover a printed layer in the form of a printed transparent sheet 1640. This embodiment is provided with a diffuser 1620 behind the printed layer and an edge lighting light source 430, like in FIG. 6, so that the light enters the diffuser 1620 and becomes refracted so that light evenly emanates from diffuser 1620 and passes through the printed layer. The edge lighting light source 430 may be powered by any conventional power source or any power source described herein. When the printed layer is in the form of a printed transparent sheet 1640, areas which are not printed allow light from the diffuser 1620 to pass through to a viewer or observer, while printed areas block light, so that a message or graphic is displayed.

[0082] The printed transparent sheet 1640 may be adhered to the non-opaque material 1610 or a sign assembly 1600 can

be made by layering the non-opaque material **1610**, the printed backing or sheet **1640**, the diffuser **1620**, and a rigid backing substrate **180**, all held together with stand-off screws, corner protectors **190** in FIG. 1, or other fastening devices known in the art. In some embodiments, the printed transparent sheet **1640** may be sheer paper, non-opaque plastic, or other transparent or semi-transparent materials known to one of ordinary skill in the art.

[0083] Alternatively, instead of using a separate printed sheet **1640**, an embodiment may include printing directly onto the non-opaque material **1610** using screen-printing, ink jet printing, or other known printing methods. Regardless of the medium, the printed indicia may be an image, message, graphic, symbol, or advertisement.

[0084] A rigid backing substrate **180** may be coupled behind the diffuser **1620** to provide structural rigidity or a mounting surface for a spinning device **800** (FIG. 8).

[0085] In any embodiment of the invention involving handheld signage products, such as shown in FIG. 8, aspects of the invention may employ a ball-bearing spinner or other spinning device **800** mounted to the rigid backing substrate **180** to allow for an attention-getting spin to be created by a user. The spinning mechanism may be a rotating ball bearing mechanism comprised of a circular race plate **810**, a circular race **820**, ball bearings **830**, and a handle **840** mounted to the circular race plate **810** allowing for the sign to be held by the spinning mechanism itself. An alternative embodiment of the spinning device could include a circular array of ball bearings, with each ball bearing individually restrained within a cup or socket attached to a top circular disk plate. The top circular disk plate could be rotationally connected to a lower circular disk plate such that the connection between the two plates allows for smooth rotation because of the ball bearing array. The lower circular disk plate could be adhesively or otherwise attached to a sign or rigid backing substrate **180** to be used in a manner similar to the use of spinning device **800** in FIG. 8. The top circular disk plate could be attached to a handle. When a spin is desired, the individual simply grabs an edge of the sign, holds the handle on the spinning mechanism and thrusts the edge in the desired direction for the spin to take place. It is possible to contain the power source and/or power inverter within the spinning device **800** to reduce clutter on the back of the sign to a single mechanism. This also ensures that a center of gravity can be near the rotational axis of the spin.

[0086] In other embodiments of the invention, the entire signage product **100** or **400** may be rounded or planar. This just requires forming each component element as desired. FIGS. 9-15 provide some examples of sign styles as disclosed in this document. Multiple sign orientations may result in different shapes for different purposes. Handheld signs may employ the handheld features such as the spinner **800** to create an additional unique effect to attract the attention of traffic passing by. A-frame signs use either existing sign bases or use custom built frames to allow for electroluminescent signage to be installed. The unique ability to use this sign in the day and evening hours makes the use of a solar recharging system ideal. The sign can be left out during the day showcasing its message in the sunlight while gathering solar energy for powering the lighting after a photovoltaic sensor is triggered. This disclosure, however, is not intended to be limited to such signage styles. It should be clear to those of ordinary skill in the art that these examples of particular implementations provided in this disclosure are simply

examples, and that there are many other possible ways of constructing signage. This disclosure is not intended to limit or exclude particular implementations by nature of not specifically explaining it here.

I claim:

1. An illuminated signage system, comprising:
 - a printed surface coupled to a first side of a substrate layer,
 - an adhesive sheet coupled to an opposite side of the substrate layer,
 - a rigid backing substrate coupled to the adhesive sheet, and
 - at least one electroluminescent element embedded within the printed surface and the substrate layer or coupled between the printed surface and the substrate layer.
2. The illuminated signage system of claim 1, wherein the electroluminescent element is embedded through the adhesive sheet.
3. The illuminated signage system of claim 1, wherein there is a spacing layer coupled between the adhesive sheet and the rigid backing substrate such that the electroluminescent element also passes within the spacing layer.
4. The illuminated signage system of claim 1, further comprising a power source.
5. The illuminated signage system of claim 4, wherein the power source is a transformer configured to be powered by an electrical outlet.
6. The illuminated signage system of claim 4, wherein the power source is portable.
7. The illuminated signage system of claim 4, wherein the power source comprises at least one battery.
8. The illuminated signage system of claim 4, wherein the power source comprises at least one solar cell.
9. The illuminated signage system of claim 1, wherein the electroluminescent element forms a lighted image of at least one of a symbol, text, or number.
10. The illuminated signage system of claim 1, further comprising a spinning device configured to rotate the illuminated signage system.
11. The illuminated signage system of claim 10, wherein the spinning device comprises a turntable and contains a portable power source configured to supply power to the electroluminescent element.
12. The illuminated signage system of claim 1, further comprising a non-opaque top layer coupled to the printed surface.
13. The illuminated signage system of claim 1, further comprising at least one corner protector.
14. The illuminated signage system of claim 1, wherein the electroluminescent element is a wire, sheet, or ribbon.
15. The illuminated signage system of claim 1, wherein the electroluminescent element is woven in and out of the printed surface such that the electroluminescent element appears discontinuous on the printed surface.
16. An illuminated signage system comprising:
 - a non-opaque material having an etched portion that diffuses light from a light source adjacent to the non-opaque material,
 - a printed layer having indicia thereon, the indicia being visible through the non-opaque material, wherein the printed layer is coupled to the non-opaque material; and
 - a power source supplying power to the light source.
17. The illuminated signage system of claim 16, wherein the printed layer is a printed sheet repeatably separable from the non-opaque material.

18. The illuminated signage system of claim **16**, wherein the printed layer is coupled to a rigid backing substrate.

19. The illuminated signage system of claim **18**, wherein a spinning device is coupled to the rigid backing substrate, the spinning device being configured to rotate the illuminated signage system.

20. The illuminated signage system of claim **19**, wherein the spinning device contains the power source.

21. The illuminated signage system of claim **16**, further comprising a protective border.

22. The illuminated signage system of claim **21**, wherein the protective border shrouds the light source.

23. The illuminated signage system of claim **16**, wherein the light source comprises a light-emitting diode.

24. The illuminated signage system of claim **16**, wherein the non-opaque material comprises a sheet of acrylic, glass, or polycarbonate.

25. The illuminated signage system of claim **16**, wherein the etched portion comprises a surface of the non-opaque material and is adjacent to the printed layer.

26. The illuminated signage system of claim **16**, wherein the etched portion is internal to the non-opaque material.

27. A method of forming an illuminated signage system, the method comprising:

providing a printed surface,

coupling the printed surface to a first side of a substrate layer,

providing an adhesive sheet,

coupling the adhesive sheet to an opposite side of the substrate layer,

providing a rigid backing substrate,

coupling the rigid backing substrate to the adhesive layer,

providing an electroluminescent element,

embedding the electroluminescent element through the printed surface such that the electroluminescent element protrudes into at least the substrate layer, the adhesive sheet, or the spacing layer, and

connecting the electroluminescent element to a power source.

* * * * *