CZAR
ENTERPRISE

CZAR ENTERPRISE LIMITED
Company number **08529701**
MD:- Mr. CHINTALA, Sandeep Kumar
Correspondence address: **71-75 Shelton Street, Covent Garden, London, WC2H 9JQ**

LETTER OF RECOMMENDATION/AUTHORIZATION

I, Sandeep Kumar Chintala authorise TagBot Technologies Private Limited (TTPL), SCF – 596, GF, KISHORAM COMPLEX, BURAIL, SECTOR 45-C, CHANDIGARH (UT), 160047, India having Corporate Identity Number U72200CH2019PTC042420 and also registered as MSME under Ministry of MSME and its UAM No. is PB20D0009483 to develop my patented and innovative product on solar energy.

TTPL has provided best plus affordable development services to numerous large as well as medium entrepreneurs. This is a client driven company that perform tremendously with technical innovations and creativity.

My innovative project is "Solar Cell Display Apparatus"

FILED OF THE INVENTION

The present invention relates to display operates used to display the information to a viewer. More precisely, the present invention relates to means for supplying electrical energy to equipment associated with such apparatus.

BRIEF DESCRIPTION OF THE INVENTION:

A display screen 12 comprises at least an upper layer 26, 36 and a lower layer 28, 38, 50. The display screen 12 can be a touch screen. One of the upper layer 26, 36 and lower layer 28, 38, 50 is provided as a photovoltaic layer and the other of the upper layer 26, 36 and the lower layer 28, 38, 50 is provided as a display layer. The upper layer 26, 36 can be a rigid or a flexible layer and lower layer 28, 38, 50 can also be flexible or rigid. An intermediate layer 32, 44, 48, can be provided between the upper layer 26, 36 and the lower layer 28, 38, 50. An intermediate layer 32, 44, 48 can be flexible, rigid or compressible. Each photovoltaic layer comprises at least one solar panel 52 with each solar panel 52 comprising at least one solar cell 54. The photovoltaic layer is employed to charge a power supply battery 58. The photovoltaic layer can occupy the entire display screen 12, or only a portion of the area of the display of the screen 12.

17/07/2019

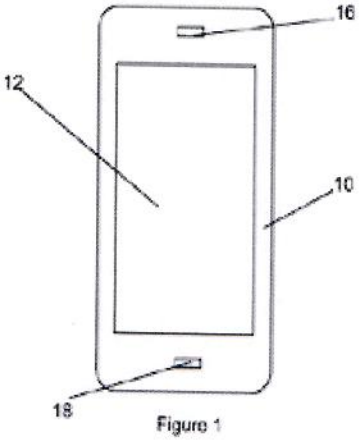

Figure 1

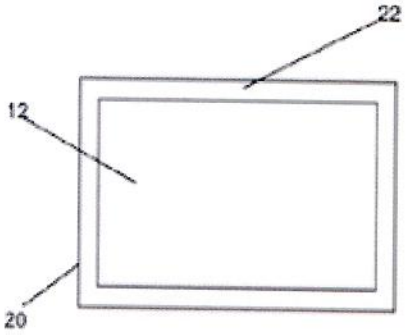

Figure 2

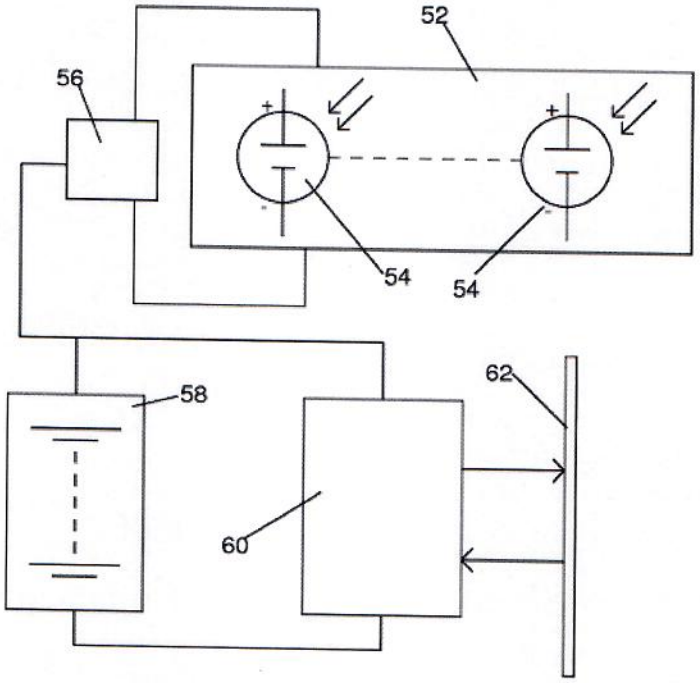

Figure 8

17/07/2019

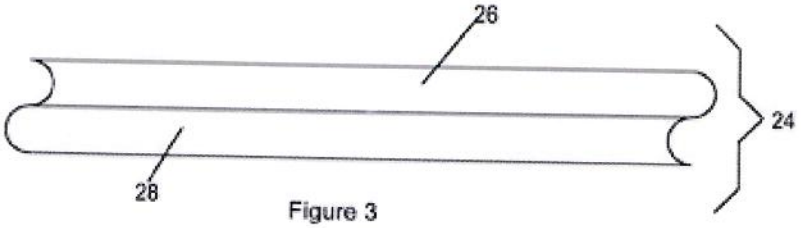

Figure 3

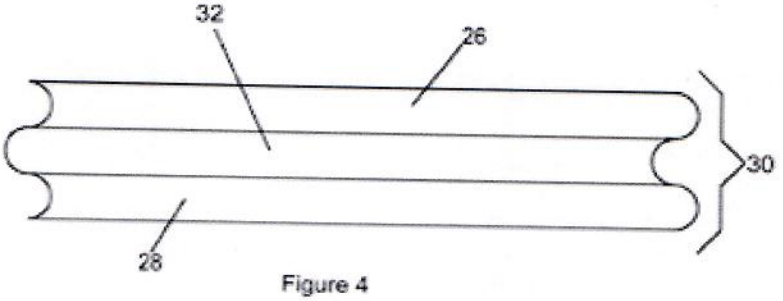

Figure 4

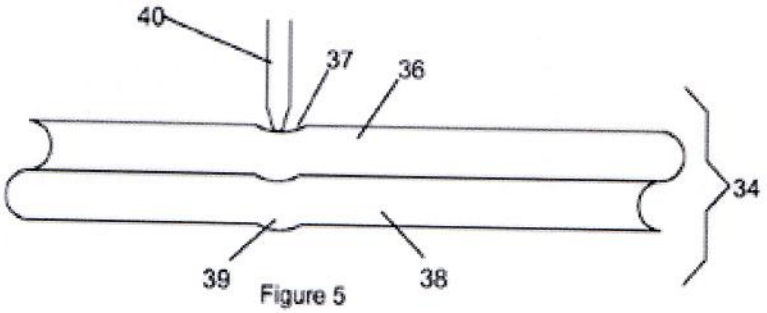

Figure 5

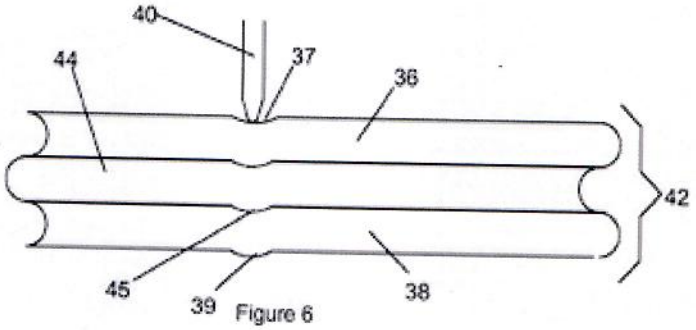

Figure 6

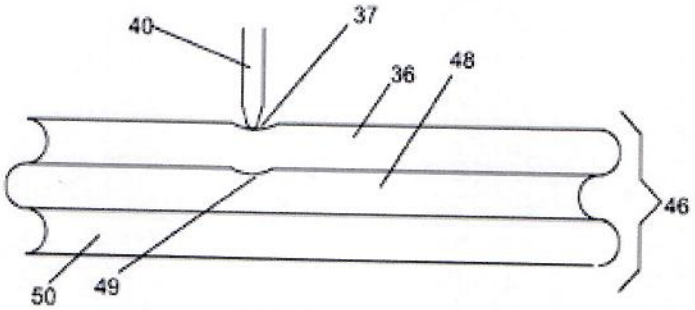

Figure 7

17/07/2019

CZAR
ENTERPRISE

Company Name	**IMPRESSIVE APPLICATIONS LTD**	TAGBOT TECHNOLOGIES PVT. LTD.
Name	Mr. SANDEEP KUMAR CHINTALA	MR. HARDEV VIRDI
Dated	17th July 2019	17th July 2019
Signed		

CZAR ENTERPRISE

CZAR ENTERPRISE LIMITED
Company number **08529701**
MD:- Mr. CHINTALA, Sandeep Kumar
Correspondence address: **71-75 Shelton Street, Covent Garden, London, WC2H 9JQ**

LETTER OF RECOMMENDATION/FUNDING

I, Sandeep Kumar Chintala authorize TagBot Technologies Private Limited (TTPL), SCF – 596, GF, KISHORAM COMPLEX, BURAIL, SECTOR 45-C, CHANDIGARH (UT), 160047, India having Corporate Identity Number U72200CH2019PTC042420 and also registered as MSME under Ministry of MSME and its UAM No. is PB20D0009483 to develop my patented and innovative product on solar energy.

TTPL has provided best plus affordable development services to numerous large as well as medium entrepreneurs. This is a client driven company that perform tremendously with technical innovations and creativity.

My innovative project is "Solar Cell Display Apparatus"

FILED OF THE INVENTION

The present invention relates to display operates used to display the information to a viewer. More precisely, the present invention relates to means for supplying electrical energy to equipment associated with such apparatus.

BRIEF DESCRIPTION OF THE INVENTION:

A display screen 12 comprises at least an upper layer 26, 36 and a lower layer 28, 38, 50. The display screen 12 can be a touch screen. One of the upper layer 26, 36 and lower layer 28, 38, 50 is provided as a photovoltaic layer and the other of the upper layer 26, 36 and the lower layer 28, 38, 50 is provided as a display layer. The upper layer 26, 36 can be a rigid or a flexible layer and lower layer 28, 38, 50 can also be flexible or rigid. An intermediate layer 32, 44, 48, can be provided between the upper layer 26, 36 and the lower layer 28, 38, 50. An intermediate layer 32, 44, 48 can be flexible, rigid or compressible. Each photovoltaic layer comprises at least one solar panel 52 with each solar panel 52 comprising at least one solar cell 54. The photovoltaic layer is employed to charge a power supply battery 58. The photovoltaic layer can occupy the entire display screen 12, or only a portion of the area of the display of the screen 12.

SUPPORT OF FUNDING FOR DEVELOPMENT

I will support TAGBOT up to 30% of the costs of the development of this project.

17/07/2019

CZAR
ENTERPRISE

Company Name	**CZAR ENTERPRISE LIMITED**	TAGBOT TECHNOLOGIES PVT. LTD.
Name	Mr. SANDEEP KUMAR CHINTALA	MR. HARDEV VIRDI
Dated	17th July 2019	17th July 2019
Signed		

(12) UK Patent Application (19) GB (11) 2508363 (13) A

(43) Date of A Publication 04.06.2014

(21) Application No: 1221444.1

(22) Date of Filing: 28.11.2012

(71) Applicant(s):
Sandeep Kumar Chintala
Flat 93-Aspects, 1 Throwley Way, Sutton, Surrey, SM1 4FD, United Kingdom

(72) Inventor(s):
Sandeep Kumar Chintala

(74) Agent and/or Address for Service:
Sandeep Kumar Chintala
Flat 93-Aspects, 1 Throwley Way, Sutton, Surrey, SM1 4FD, United Kingdom

(51) INT CL:
G02F 1/133 (2006.01) *G02F 1/1333* (2006.01)

(56) Documents Cited:
EP 2247084 A1 **WO 2012/104503 A1**
JP 2003167233 A **US 20070164980 A1**
US 20060022925 A1

(58) Field of Search:
INT CL **G02F**
Other: **WPI, EPODOC, TXTEN**

(54) Title of the Invention: **Solar cell display apparatus**
Abstract Title: **Solar cell display apparatus**

(57) A display screen 12 comprises at least an upper layer 26, 36 and a lower layer 28, 38, 50. The display screen 12 can be a touchscreen. One of the upper layer 26, 36 and lower layer 28, 38, 50 is provided as a photovoltaic layer and the other of the upper layer 26, 36 and the lower layer 28, 38, 50 is provided as a display layer. The upper layer 26, 36 can be a rigid or flexible layer, and the lower layer 28, 38, 50 can also be flexible or rigid. An intermediate layer 32, 44, 48, can be provided between the upper layer 26, 36 and the lower layer 28, 38, 50. The intermediate layer 32, 44, 48 can be rigid, flexible or compressible. Each photovoltaic layer comprises at least one solar panel 52 with each solar panel 52 comprising at least one solar cell 54. The photovoltaic layer is employed to charge a power supply battery 58. The photovoltaic layer can occupy the entire display screen 12, or only a proportion of the area of the display screen 12.

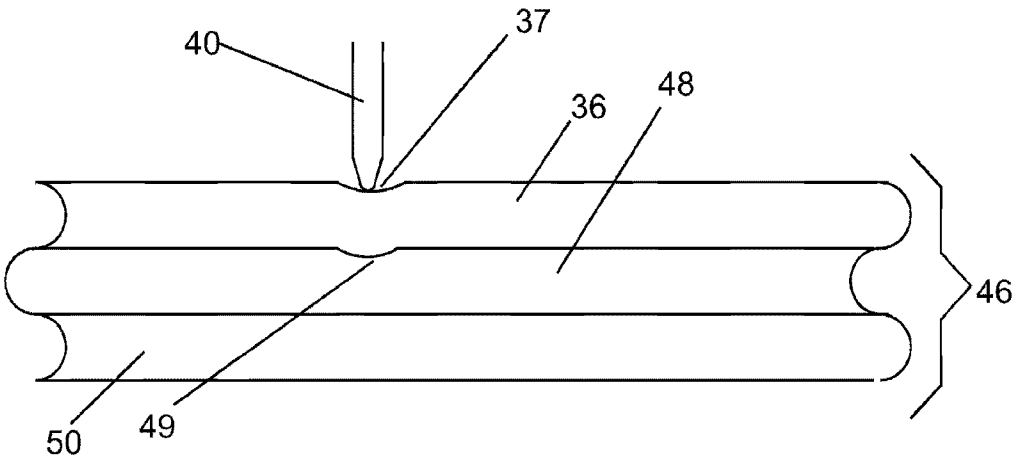

Figure 7

GB 2508363 A

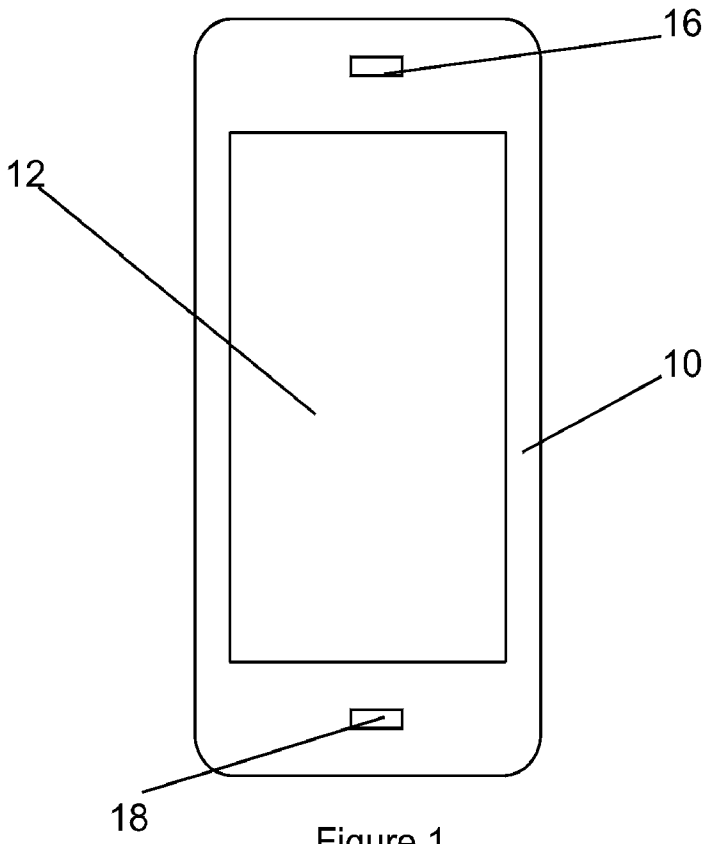

Figure 1

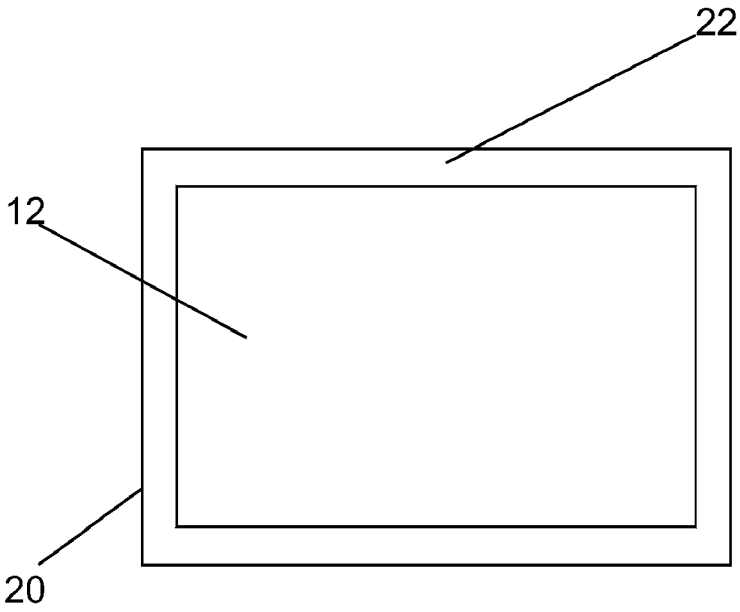

Figure 2

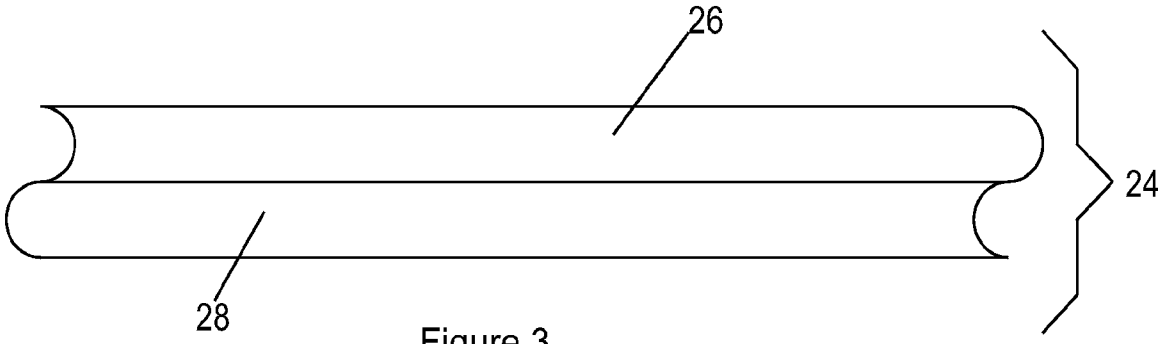

Figure 3

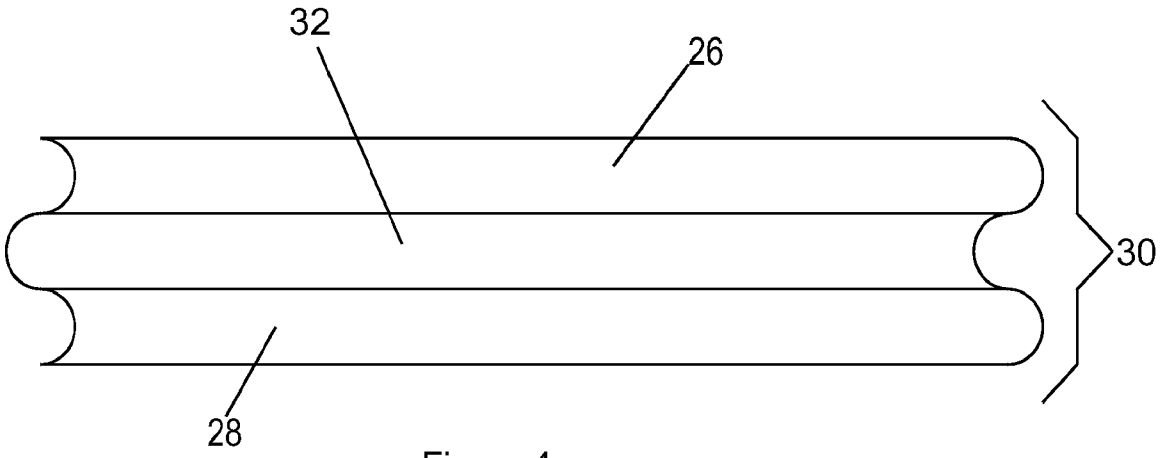

Figure 4

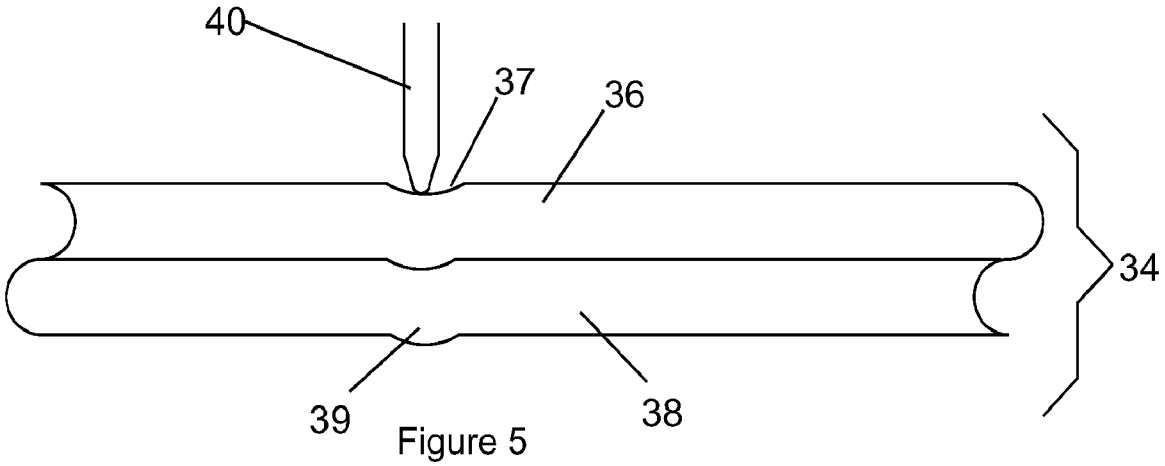

Figure 5

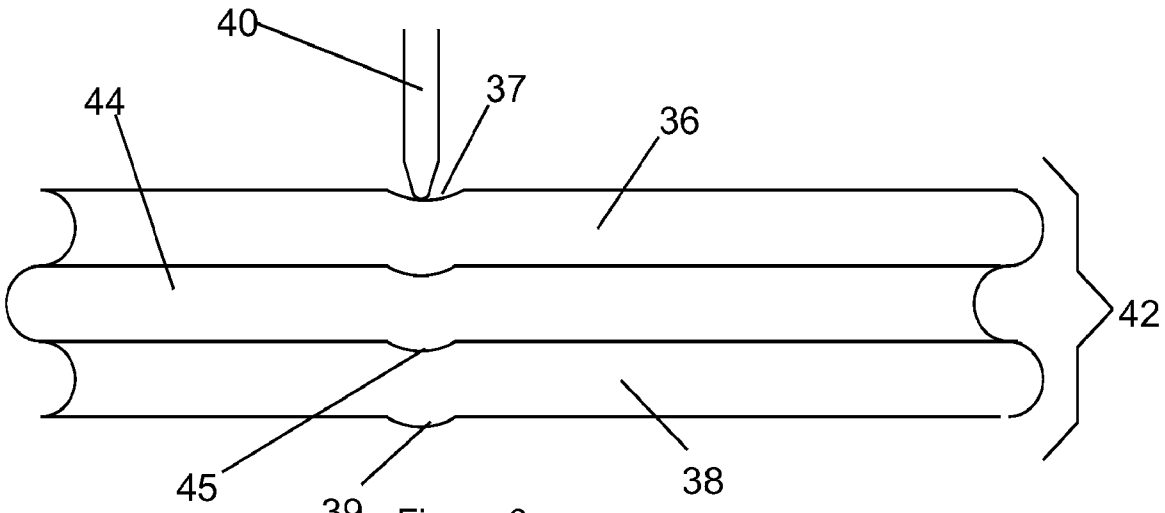

Figure 6

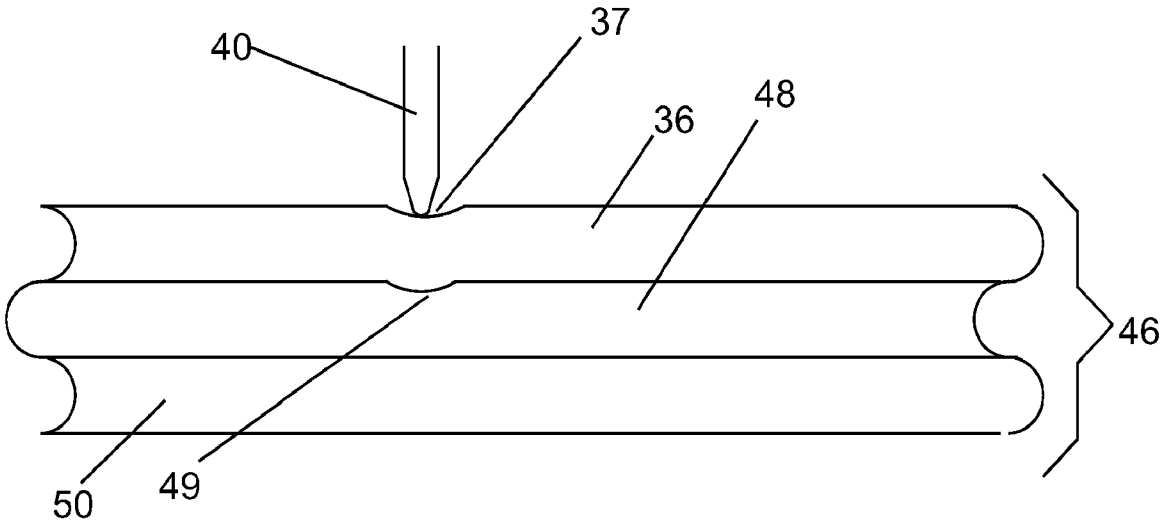

Figure 7

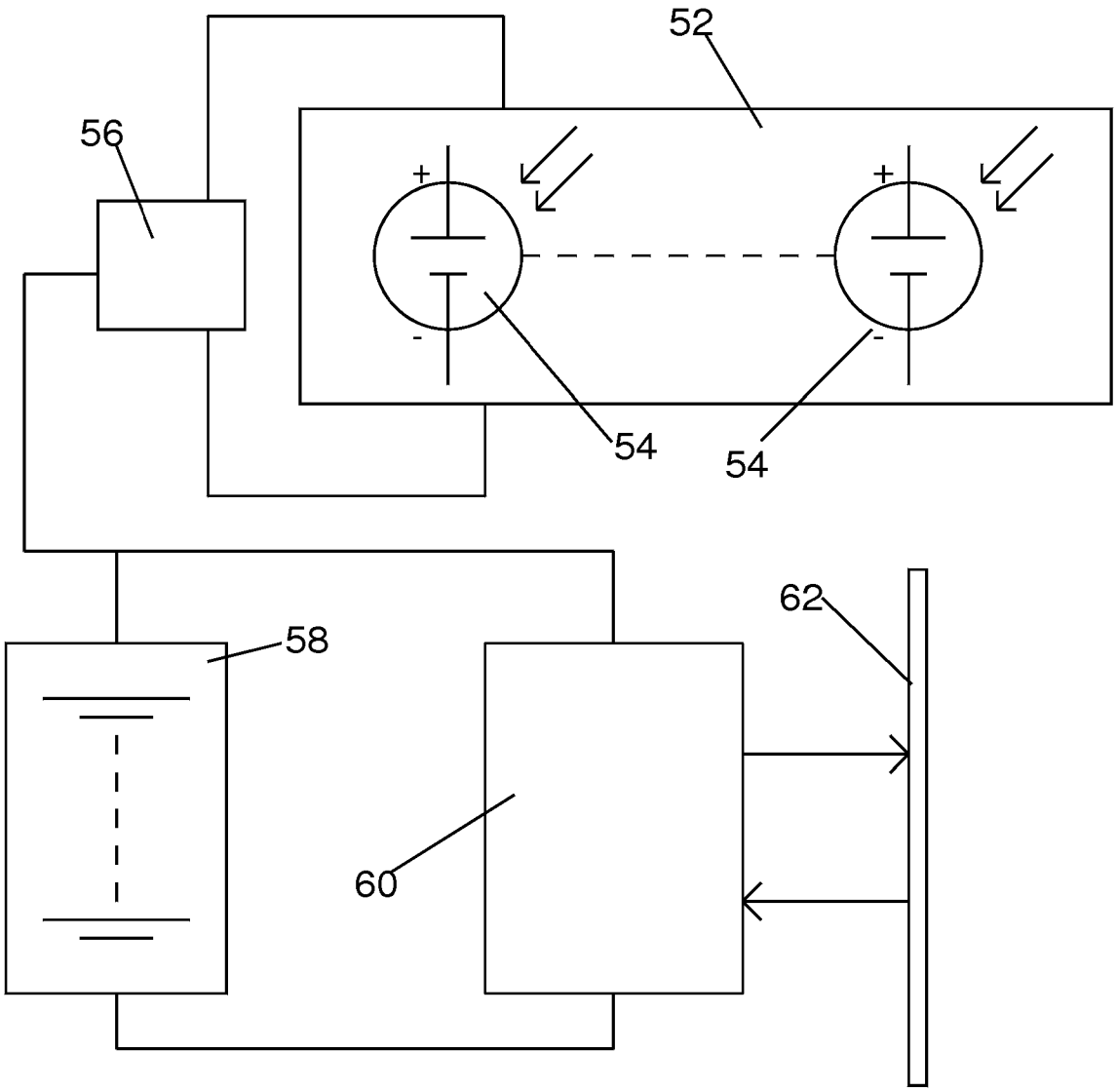

Figure 8

Solar cell display apparatus

Field of the invention

The present invention relates to display apparatus used to display information to a viewer. More precisely, the present invention relates to means for supplying electrical energy to equipment associated with such apparatus.

The prior art

It is known to employ one or more solar panels in a digital apparatus such as a calculator, a mobile telephone, a computer apparatus and a display that displays advertising material driven by a digital signal. The one or more solar panels are provided on any convenient surface, such as a portion of the face whereon the display screen is provided, or on the top, sides or rear of the apparatus.

3G phones and tablets, together with the new 4G phones, provide the display screen over nearly the entirety of the face surface of the apparatus. The apparatus is made as thin as possible thereby removing the possibility of providing a solar panels on the sides, top or bottom of the apparatus. The apparatus is used with its rear surface facing generally downwards, making any solar panel attached to the rear surface substantially in operable.

In display screen advertising panels or public television sets almost all of the display surface is taken up by the display screen. Display screen advertising panels or public television sets are generally attached on or proximately to an obscuring fence or wall making rear surface attachment of a solar panel ineffective. Display screen advertising panels of public television sets are also made to be as thin as possible, thereby introducing all of the problems associated with tablets and phones.

Many display providing apparatus employ touch screens of one kind or another to provide input. There are five basic types of touch screen displays: resistive, capacitive, infrared, surface acoustic wave (SAW) and strain gauge. Resistive and capacitive touch screen displays are the most common. Resistive touch screens

consist of a glass was or acrylic panel that is coated with electrically conductive and resistive layers. The thin layers are separated by invisible separator dots. During operation, an electrical current moves through the screen. When pressure is applied to the touch screen, the layers are pressed together, causing a change in the electrical current and a touch event to be registered. A capacitive touch screen consists of a glass panel with a capacitive (charge storing) material coating its surface. Circuits located at corners of the screen measure the capacitance of a person touching the overlay. Frequency changes are measured to determine the X and Y coordinates of the touch event. Infrared touch screens are similar to resistive products. Infrared touch screens project horizontal and vertical beams of infrared light over the surface of the screen. When a finger or other object breaks those beams, the X/Y coordinates are calculated. Surface acoustic wave (SAW) technology sends acoustic waves across a clear glass panel with a series of transducers and reflectors. When a finger touches the screen, the waves are absorbed, causing a touch event to be detected at that point. In a strain gauge touch screen, the screen is spring mounted on the four corners and strain gauges are used to determine deflection when the screen is touched. This touch screen display technology can also measure the Z-axis. The present invention is usable with any of these technologies.

The use of one or more cameras facing towards the user has been employed to determine one, the other or both of the users body position and gestures and the position and movements of the users digits. Examples of this are to be found in the Kinectic (®trademark) game console and in various gesture controllable television and Internet access sets. The present invention is also usable with such devices.

Various prior art approaches have been made.

European patent application EP1209650 (A1) discloses a data display module for processing devices, and more particularly employing liquid crystal displays. The data display module contains a liquid crystal display consisted of two in-plane plates with electrodes and polarizers, whereby a liquid crystal and a supply cell which is electrically connected to the display are located between said plates. The supply cell, which consists of as at least one solar element or a battery of solar cells, is

located or formed on the rear side of the display plate, whereby the display elements located on the light-receiving side of the cell are at least partially made of optically transparent materials. A touch screen and/or graphic tablet can be formed on the front side of the display. The present invention seeks to provide improvement there over by permitting a wider range of display module types and greater flexibility in how solar energy is provided.

European patent application EP2365383 (A2) discloses a monitor unit that has a light emitting display (12) i.e. transreflexive LCD, and a solar cell arrangement for supplying a display with electrical power. The arrangement is a transparent and integral component of a front panel or an integral component of a front-sided region of the LCD. The front panel comprises a glass disk, and a front side and/or rear side of the glass disk is coated with transparent solar cells e.g. amorphous silicon solar cells. The solar cells comprise silver nano particles, and a backlight panel (16) is arranged behind the LCD. The solar cells are formed as metamorphic solar cells, organic solar cells, copper indium gallium diselenide foils, nano solar cells, hybrid solar cells and/or N-type silicon or carbon nanotubes solar cells. The present invention seeks to provide improvement there over by permitting a wider range of display module types and greater flexibility in how solar energy is provided.

European patent application EP0785527 (A2) discloses a smart card that transfers information between the smart card and an external system while having the capability of being accessed by a user. The smart card includes a microprocessing unit (MPU) for executing instructions stored in memory, a display, coupled to the MPU, for displaying information, a keypad, coupled to the MPU and to the display, for entering data by the user, an interface for transferring signals between smart card and the external system when the smart card is coupled to the external system, and photovoltaic cells for providing power to the smart card when the smart card is exposed to light. The smart card does not require the use of a bulky and inflexible battery and since the solar cells used are flexible, the flexibility of the smart card is maintained. The present invention seeks to provide improvement over by permitting the integration of the photovoltaic cells to be integrated within the display while still retaining any required property of flexibility.

The present invention is also applicable for display screens where control is provided by keyboard and/or voice entry.

The present invention seeks to improve over the apparatus disclosed in above documents by simplifying surface layout and increasing the area of available for solar energy collection.

Summary of the invention

The present invention consists in a the visual display apparatus comprising:

an upper layer;

and

a lower layer;

the upper layer being provided closer to a user than the lower layer when the apparatus is being viewed; where

either

the upper layer is a photovoltaic layer operable to supply electrical energy and the lower layer is a display layer;

or

the upper layer is a display layer and the lower layer is a photovoltaic layer operable to supply electrical energy;

The invention also provides that the apparatus can comprise an intermediate layer between the upper layer and the lower layer.

The invention also provides that the intermediate layer can be transparent if the lower layer is a display layer and can be transparent or translucent if the lower layer is over photovoltaic layer.

The invention also provides that the intermediate layer can be one of: a flexible intermediate layer; and a compressible intermediate layer.

The invention also provides that the photovoltaic layer can have the same extent as a display layer, or can have a lesser extent than the display layer.

The invention also provides that the display apparatus can be a touchscreen.

The invention also provides that the apparatus can be adapted for use in at least one of: a portable telephone device; a tablet; an advertising display; a television set; a desktop PC display; and a laptop PC display.

The invention also provides that the apparatus can be operable to provide input to supervisory electronics to charge a power supply battery.

The invention also provides that the photovoltaic layer can comprise at least one solar panel and that each solar panel can comprise at least one solar cell.

Brief description of the drawings

The invention is further explained, by way of example, by the following description can be read in conjunction with the appended drawings, in which:

Figure 1 shows, by way of example, a typical 3G or 4G portable telephone device suitable for use with the invention.

Figure 2 shows, by way of example, a typical tablet device suitable for use with the invention.

Figure 3 shows an exemplary two layer combined display and solar panel.

Figure 4 shows an exemplary three layer combined display and solar panel.

Figure 5 shows an example of a two layer combined display and solar panel suitable for use in contact touch screen applications.

Figure 6 shows an exemplary three layer contact touch screen combined display and solar panel.

Figure 7 shows an exemplary hard-back three layer contact touch screen combined display and solar panel .

and

Figure 8 shows an exemplary block diagram of internal arrangements of equipment supporting the invention .

Detailed description of the embodiments

Attention is first drawn to Figure 1 showing a portable telephone device 10 wherein a display screen 12 fills almost the entirety of the front surface 14 of the portable telephone device 10. Other features, not important to the present invention, include an earpiece apertures 16 and a microphone 18.

Attention is also drawn to Figure 2 showing an exemplary tablet 20 also has its display screen 12 almost filling its front surface 22. Such a tablet is also suitable for use with the invention.

Figure 2 may also be taken as an example of any other type of display apparatus such as, but not limited to: advertising hoardings; advertising wall displays; television apparatus; and sports ground displays.

Attention is next drawn to Figure 3, showing an exemplary two layer combined display and solar panel.

The two layer panel 24 comprises an upper layer 26 that faces towards the user of the apparatus 10 20 when the apparatus in is in use, and a lower layer 28 that is disposed on the other side of the upper layer 26. Both the upper layer 26 and the lower layer 28 are preferred to extend across the entire display screen 12.

In a first variant the upper layer 26 is a photovoltaic layer operable to supply electrical energy to the apparatus 10 20 and the lower layer 28 is a display layer capable of displaying an image. The display panel 12 may or may not comprise use

of back lighting depending upon the type of display. For example, some liquid crystal displays do not employ backlighting. Where backlighting is employed of course, the photovoltaic layer absorbs some of the energy from the backlighting thereby conserving energy consumption.

In a second variant the lower layer 28 is a photovoltaic layer and the upper layer 26 is a display layer.

The examples shown in Figure 3 are suitable for use where non-contact or non-depression input communication is used. Such types of styles of input include, but are not limited to: no control of any kind; keyboard control; capacitive control; surface active wave control; and capacitive control.

Attention is next drawn to Figure 4 showing an exemplary three layer combined display and: solar panel.

The three layer combined display and solar panel 30, as well as comprising an upper layer 26 and a lower layer 28 as shown in Figure 3, also comprises an intermediate layer 32 sandwiched between the upper layer 26 and the lower layer 28. In the example shown, the intermediate layer 32 can be rigid or flexible.

Just as with the example of Figure 3, in a first variant the upper layer 26 is a photovoltaic layer operable to supply electrical energy to the apparatus 10 20 and the lower layer 28 is a display layer capable of displaying an image. The display panel 12 may or may not comprise use of back lighting depending upon the type of display. For example, some liquid crystal displays do not employ backlighting. Where backlighting is employed of course, the photovoltaic layer absorbs some of the energy from the backlighting thereby conserving energy consumption.

Again, just as for the Figure 3 example, in a second variant of the Figure 4 example, the lower layer 28 is a photovoltaic layer and the upper layer 26 is a display layer.

The examples shown in Figure 4 are suitable for use where non-contact or non-depression communication is used. Such types of control include, but are not limited

to: no control of any kind; keyboard control; capacitive control; surface active wave control; and capacitive control.

Attention is next drawn to Figure 5 showing an example of a two layer combined display and solar panel suitable for use in contact touch screen applications.

The two layer contact touch screen combined display and solar panel 34 comprises a flexible upper layer 36 and a flexible lower layer 38 that can be depressed by a stylus 40 to make input selections and moves.

As the stylus 40 is urged against the two layer contact touch screen combined display and solar panel 34, it creates an upper layer depression 37 that is communicated at least in part to the lower layer 38 to create a lower layer depression 39.

In the example shown in Figure 5, both the upper flexible layer 36 and the lower flexible layer 38 are required to be flexible. In a first variant the upper flexible layer 36 is a photovoltaic layer operable to supply electrical energy to the apparatus 10 20 and the lower flexible layer 38 is a display layer capable of displaying an image. The display panel may 12 or may not comprise use of back lighting depending upon the type of display. For example, some liquid crystal displays do not employ backlighting. Where backlighting is employed of course, the photovoltaic layer absorbs some of the energy from the backlighting thereby conserving energy consumption.

In a second variant of the example shown in Figure 5, the flexible lower layer 38 is a photovoltaic layer and the upper flexible layer 36 is a display layer.

Attention is next drawn to Figure 6 showing an exemplary three layer contact touch screen combined display and solar panel.

The three layer contact touch screen combined display and solar panel 42 also comprises an upper flexible layer 36 and a lower flexible layer 38. In addition, the three layer contact touch screen combined display and solar panel 42 comprises a

flexible intermediate layer 44. When the stylus 40 is urged against the display screen, as well as the upper layer depression 37 and the lower layer depression 39 it also creates an intermediate layer depression 45.

In a first variant of the Figure 6 example the upper flexible layer 36 can be a photovoltaic layer and the lower flexible layer 38 can be a display layer.

In a second variant of the Figures 6 example the upper flexible layer 36 can be a display layer and the lower flexible layer 38 can be photovoltaic layer.

The display panel 12 shown in the figure 6 example may or may not comprise use of back lighting depending upon the type of display. For example, some liquid crystal displays do not employ backlighting. Where backlighting is employed of course, the photovoltaic layer absorbs some of the energy from the backlighting thereby conserving energy consumption.

Attention is next drawn to Figure 7 showing an exemplary hard-back three layer contact touch screen combined display and solar panel 46.

The hard-back three layer contact touch screen combined display and solar panel 46 comprises a flexible upper layer 36, a compressible intermediate layer 48, and a rigid lower layer 50. When the stylus 40 is urged against the upper layer 36 it creates an upper layer depression 37 and a compressible intermediate layer upper surface depression 49. The depression 37 49 is not transferred to the rigid lower layer 50, but absorbed by the compressibility of the compressible intermediate layer 48. This configuration allows for the upper layer 36 to be a touch sensitive display layer and for the rigid lower layer 50 to be a solar panel that can be rigid. Of course, the solar panel can also be flexible or partially flexible.

As for the examples shown in Figures 3-6, the display panel 12 shown in the Figure 7 example may or may not comprise use of back lighting depending upon the type of display. For example, some liquid crystal displays do not employ backlighting. Where backlighting is employed of course, the photovoltaic layer absorbs some of the energy from the backlighting thereby conserving energy consumption.

It is to be understood that the intermediate layers 32 44 48 are transparent when the lower layer 38 50 is a display layer and transparent or translucent when the lower layer 38 50 is a photovoltaic layer.

Finally, attention is drawn to figure 8 showing an exemplary block diagram of internal arrangements of equipment supporting the invention.

The upper layers 26 36 or the lower layers 28 38 50, depending upon which example is chosen, can be a photovoltaic layer. In the photovoltaic layer one or more solar panels 52 each comprising one or more solar cells 54 the solar panels and the solar cells 54 can be connected in series, connected in parallel, or any combination thereof that allows operation.

The one or more solar cells 52 provide input to control and supervisory electronics 56. The supervisory electronics 56 can be as simple as a charge pump that keeps a power supply battery 58 charged. With a charge pump the voltage of the power supply battery 58 keeps the output voltage equal to its terminal voltage. The supervisory electronics 56 can contain other elements together with and instead of the charge pump, including but not limited to inverters and voltage regulators.

The power supply battery 58 and the supervisory electronics 56 together supply operating power to all other parts 60 of the apparatus 10 20. The display screen 62 of the display layer is integrated with the photovoltaic layer as earlier described. The display screen 62 can also provide control and data input to the other parts 60 of the apparatus 10 20 and accept image defining input signals to control the display screen 62.

Not shown in figure 8 can also be input ports for receiving keyboard input and one or more cameras for detecting these user's body and/or digit positions and motions.

It is to be appreciated that the invention can equally be applied to any kind of display including, but not limited to, desktop and laptop PC displays.

it is also to be appreciated that the extent of the photovoltaic layer need not coincide with the extent of display layer. Other options within the invention include the photovoltaic layer occupying the whole or only a part of the area of the display screen 12.

Those skilled in the art will be aware of many other variations that can be applied without going outside of the invention as claimed.

The invention is now more clearly defined by the following appended claims.

Claims

1. A visual display apparatus comprising:

an upper layer;

and

a lower layer;

the upper layer being provided closer to a user than the lower layer when the apparatus is being viewed; where

either

the upper layer is a photovoltaic layer operable to supply electrical energy and the lower layer is a display layer;

or

the upper layer is a display layer and the lower layer is a photovoltaic layer operable to supply electrical energy;

2. The apparatus of claim 1 further comprising an intermediate layer between the upper layer and the lower layer.

3. The apparatus of claim 2 wherein the intermediate layer is transparent if the lower layer is a display layer and transparent or translucent if the lower layer is a photovoltaic layer.

4. The apparatus of claim 2 or claim 3 wherein the intermediate layer is one of: a flexible intermediate layer; and a compressible intermediate layer.

5. The apparatus of any of the preceding claims where in the photovoltaic layer has the same extent as a display layer, or a lesser extent than the display layer.

6. The apparatus of any of the preceding claims wherein the display apparatus is a touchscreen.

7. The apparatus of any of the preceding claims adapted for use in at least one of: a portable telephone device; a tablet; an advertising display; a television set; a desktop PC display; and a laptop PC display.

8. The apparatus of any of the preceding claims operable to provide input to supervisory electronics to charge a power supply battery.

9. The apparatus of any of the preceding claims wherein each photovoltaic layer comprises at least one solar panel and where in each solar panel comprises at least one solar cell.

10. An apparatus substantially as described with reference to the appended drawings.

Application No: GB1221444.1 **Examiner:** Helen Edwards

Claims searched: All **Date of search:** 14 December 2012

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 2, 3, 4, 5, 6, 7, 8, 9	US2007/0164980 A1 (MANNING VENTURES INC) See figure 7 and paragraphs 0049, 0052, 0072
X	1, 2, 3, 4, 5, 6, 7, 8, 9	US2006/022925 A1 (MANNING) See figure 7 and paragraphs 0065, 0071-0073
X	1, 2, 3, 4, 5, 6, 7, 8, 9	JP2003167233 A (NUMATA ET AL) See English abstract and figure 2
X	1, 2, 3, 4, 5, 6, 7, 8, 9	EP2247084 A1 (LG ELECTRONICS INC) See figure 7 and paragraphs 0061, 0065, 0090, 0146
X	1, 2, 3, 4, 5, 6, 7, 8, 9	WO2012/104503 A1 (WYSIPS) See figure 2 and English abstract

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

G02F

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, TXTEN

International Classification:

Subclass	Subgroup	Valid From
G02F	0001/133	01/01/2006
G02F	0001/1333	01/01/2006

Espacenet search results on 17-07-2019 09:01

1 application(s) for: GB2508363 (A)
Displaying selected publications

Publication	Title	Page
GB2508363 (A)	Solar cell display apparatus	2

(12) UK Patent Application (19) GB (11) 2508363 (13) A

(43) Date of A Publication 04.06.2014

(21) Application No: 1221444.1

(22) Date of Filing: 28.11.2012

(71) Applicant(s):
Sandeep Kumar Chintala
Flat 93-Aspects, 1 Throwley Way, Sutton, Surrey, SM1 4FD, United Kingdom

(72) Inventor(s):
Sandeep Kumar Chintala

(74) Agent and/or Address for Service:
Sandeep Kumar Chintala
Flat 93-Aspects, 1 Throwley Way, Sutton, Surrey, SM1 4FD, United Kingdom

(51) INT CL:
G02F 1/133 (2006.01) *G02F 1/1333* (2006.01)

(56) Documents Cited:
EP 2247084 A1 **WO 2012/104503 A1**
JP 2003167233 A **US 20070164980 A1**
US 20060022925 A1

(58) Field of Search:
INT CL **G02F**
Other: **WPI, EPODOC, TXTEN**

(54) Title of the Invention: **Solar cell display apparatus**
Abstract Title: **Solar cell display apparatus**

(57) A display screen 12 comprises at least an upper layer 26, 36 and a lower layer 28, 38, 50. The display screen 12 can be a touchscreen. One of the upper layer 26, 36 and lower layer 28, 38, 50 is provided as a photovoltaic layer and the other of the upper layer 26, 36 and the lower layer 28, 38, 50 is provided as a display layer. The upper layer 26, 36 can be a rigid or flexible layer, and the lower layer 28, 38, 50 can also be flexible or rigid. An intermediate layer 32, 44, 48, can be provided between the upper layer 26, 36 and the lower layer 28, 38, 50. The intermediate layer 32, 44, 48 can be rigid, flexible or compressible. Each photovoltaic layer comprises at least one solar panel 52 with each solar panel 52 comprising at least one solar cell 54. The photovoltaic layer is employed to charge a power supply battery 58. The photovoltaic layer can occupy the entire display screen 12, or only a proportion of the area of the display screen 12.

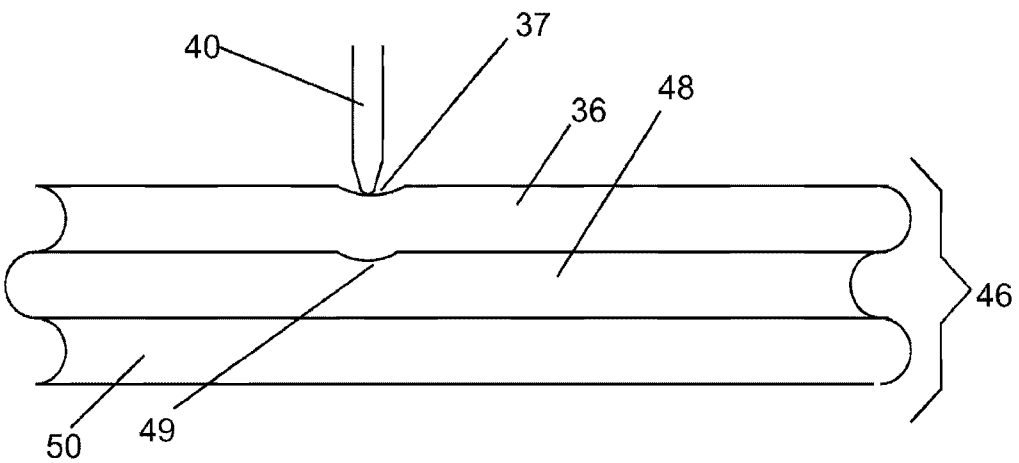

Figure 7

GB 2508363 A