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(54) Title: PRESS KEY AND METHOD OF FORMING THE SAME

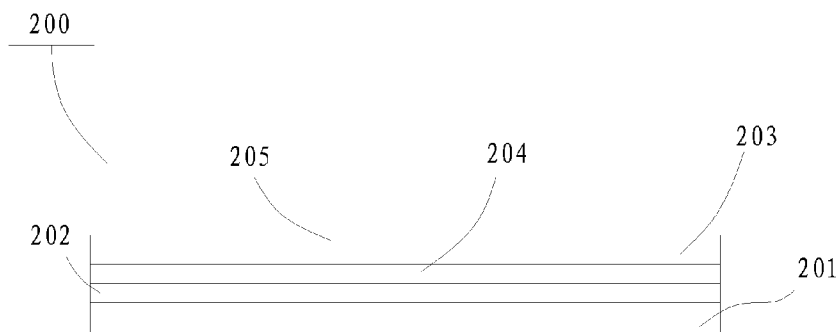


Fig. 2

(57) Abstract: The present invention discloses a press key (100) for an electronic device. The press key may comprise a press key body (101); an ink layer (102) disposed at an inner surface (1011) of the press key body (100) having a hollowed-out portion (1021) forming a desired pattern; an aluminum layer (103) configured to cover at least the hollowed-out portion (1021); and a varnish layer (104) configured to cover the aluminum layer (103) to protect the aluminum layer (103). In addition, the present invention also discloses a method of forming the same. According to the present invention, the press key (100) may have high metal quality, high gloss with lower cost.

PRESS KEY AND METHOD OF FORMING THE SAME**CROSS-REFERENCE TO RELATED APPLICATIONS**

The present application claims priority to, and benefits of Chinese Patent Application No. 200910108462.4 filed with SIPO of P.R. China on June 30, 2009, the entirety of which is incorporated herein by reference.

BACKGROUND**FIELD**

The present invention generally relates to an electronic device, more particularly to a press key with characters for the electronic device and a method of forming the same.

DESCRIPTION OF RELATED ART

A method of forming a plastic press key for an electronic device such as a mobile phone or PDA etc. generally may comprise the following steps: printing or spraying ink onto a surface of the plastic press key, then removing a portion of ink to form a desired pattern or character via laser radium carving to obtain the desired press key. However, the aesthetic appearance thereof is dull with less attraction. For achieving a press key with decorative effect with high quality and high gloss, physical vapor deposition (PVD) method or ink with special mirror surface effect may normally practiced in the art. However, because the PVD method is not stable at present, the obtained product may have impurities. Meanwhile, because the ink having the mirror surface effect is relatively thin, the operation may be difficult and the ink may block the screen during screen printing.

The two methods as mentioned above may be performed with a high demand on environment. Thus, it is difficult to perform the processes thereof with lower yield rate and higher cost, which may not satisfy industrial requirements.

SUMMARY

The present invention is directed to solve at least one problem existing in the prior art. Accordingly, a press key for an electronic device may need to be provided, which has high metal quality, high gloss with lower cost. Further, a method of forming the same may also need to be provided.

According to an aspect of the invention, a press key for an electronic device may be provided, comprising a press key body; an ink layer formed at an inner surface of the press key body having a hollowed-out portion forming a desired pattern; an aluminum layer configured to cover at least

the hollowed-out portion; and a varnish layer configured to cover the aluminum layer to protect the aluminum layer.

According to an embodiment of the invention, the press key may comprise an ultraviolet-curing ink layer formed at an external surface of the press key body.

5 According to an embodiment of the invention, the ink layer may have a thickness of about 16 μm to about 20 μm , and the aluminum layer may have a thickness of about 6 μm to about 12 μm .

According to another aspect of the invention, a method of forming a press key for an electronic device may be provided, comprising steps of: a) providing a press key body; b) forming an ink layer at a inner surface of the press key body, in which the ink layer has a hollowed-out
10 portion forming a desired pattern; c) providing a hot stamping paper comprising a base film, a silicone resin layer, an aluminum layer and an adhesive layer, in which the silicone resin layer, the aluminum layer and the adhesive layer are in turn disposed on the base film; d) performing a hot stamping with respect to the press key body using the hot stamping paper, in which the aluminum layer of the hot stamping paper is hot-stamped onto the inner surface of the press key body to
15 cover at least the hollowed-out portion of the ink layer; and e) forming a varnish layer on the aluminum layer.

According to an embodiment of the invention, the ink layer having the hollowed-out portion may be formed by screen-printing.

According to an embodiment of the invention, the hot stamping paper may further comprise
20 a pigment layer between the silicone resin layer and the aluminum layer having a color selected from a group consisting of silver, gold, red, yellow, blue and green.

According to an embodiment of the invention, the hot stamping paper may have a light transmittance of about 20%-40%.

According to an embodiment of the invention, the hot stamping may be performed at a
25 temperature of about 180-240 $^{\circ}\text{C}$ for about 2-6 seconds.

According to an embodiment of the invention, the ink layer may be resistant to a temperature which is no less than 180 $^{\circ}\text{C}$.

According to an embodiment of the invention, the method may further comprise a step of disposing an ultraviolet-curing ink layer at an external surface of the press key body.

30 With the press key and the method for forming the same according to some embodiments of the present invention, the hot stamping process is used, so that the plastic press key may achieve an appearance effect with high metal quality and high gloss, the press key manufactured by the hot stamping process may have a higher economic value comparing with the PVD or the mirror ink process, the cost may be greatly reduced and the productive efficiency may be improved
35 accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of the invention will become apparent and more readily appreciated from the following descriptions taken in conjunction with the drawings in which:

5 Fig. 1 is a perspective view of a press key according to an embodiment of the invention;

Fig. 2 is a schematic sectional view of a hot stamping paper according to an embodiment of the invention; and

Fig. 3 is a cross section view of a press key according to an embodiment of the invention.

10 DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

Reference will be made in detail to embodiments of the present invention. The embodiments described herein with reference to drawings are explanatory, illustrative, and used to generally understand the present invention. The embodiments shall not be construed to limit the present invention. The same or similar elements and the elements having same or similar functions are
15 denoted by like reference numerals throughout the descriptions.

In the description, relative terms such as “longitudinal”, “lateral”, “front”, “rear”, “right”, “left”, “lower”, “upper”, “horizontal”, “vertical”, “above”, “below”, “up”, “top”, “bottom” as well as derivative thereof (e.g., “horizontally”, “downwardly”, “upwardly”, etc.) should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These
20 relative terms are for convenience of description and do not require that the present invention be constructed or operated in a particular orientation.

An embodiment of the present invention provides a press key 100 for an electronic device such as a mobile phone, a PDA etc. However, it should be noted that other electronic device may also adopt the press key as disclosed in the present invention. Thus, the description followed and
25 the figures as hereinafter disclosed are described for illustration purpose rather than limitation.

As shown in Figs. 1 and 3, the press key 100 may comprise a press key body 101 and an ink layer 102 disposed at an inner surface 1011 of the press key body 101. The ink layer 102 may comprise a hollowed-out portion 1021 which may form a desired pattern, such as a character pattern or a figure pattern. The press key 100 according to the embodiment of the present
30 invention may further comprise an aluminum layer 103 which may at least cover the hollowed-out portion 1021 of the ink layer 102, and a varnish layer 104 covering the aluminum layer 103 so as to protect the aluminum layer 103.

In some embodiments, the press key may comprise an ultraviolet-curing ink layer 105 disposed at an external surface 1012 of the press key body 101.

35 According to an embodiment of the invention, a thickness of the ink layer 102 may be about

16 um – about 20 um and a thickness of the aluminum layer 103 may be about 6 um – about 12 um.

Another embodiment of the present invention provides a method of forming a press key 100 for an electronic device, comprising steps of: a) providing a press key body 101; b) forming an ink layer 102 at an inner surface 1011 of the press key body 101, in which the ink layer 102 may have a hollowed-out portion 1021 forming a desired pattern such as a character pattern or a figure pattern; c) providing a hot stamping paper 200, also called an electrolytic aluminum foil, comprising a base film 201, a silicone resin layer 202, an aluminum layer 203 and an adhesive layer 205, in which the silicone resin layer 202, the aluminum layer 203 and the adhesive layer 205 are in turn disposed on the base film 201, as shown in Fig. 2; d) performing hot stamping process with respect to the inner surface 1011 of the press key body 101 using the hot stamping paper 200, in which the aluminum layer 203 of the hot stamping paper 200 is hot stamped or printed onto the inner surface 1011 of the press key 100 which may at least cover the hollowed-out portion 1021, the press key 100 is disposed between the upper and lower molds (not shown) and secured by the lower mold, the upper mold is made of silicone rubber, and the portions of the upper mold on which the hot stamping is performed are convex, during hot stamping, the aluminum layer in the hot stamping paper 200 pressed by the convex portions may be formed onto the inner surface 1011 of the press key 100 accordingly; and e) forming a varnish layer 104 on the aluminum layer 103.

In embodiments of the present invention, there is no special limit to the material of the press key body 101, and any suitable material in the art may be used. For example, the press key body 101 may be made of one or more selected from a group comprising polycarbonate (PC), acrylonitrile- butadiene- styrene copolymer (ABS), polymethyl methacrylate (PMMA), and polyethylene terephthalate (PET) by injection molding.

The ink layer 102 having the hollowed-out portion 1021 may be formed by screen-printing or a process comprising steps of spraying ink and then removing a portion of ink so as to form the desired pattern via laser radium carving. In some embodiments of the present invention, the screen printing process is preferable. The screen printing process may be performed as follows: the ink may penetrate through meshes in the pictographic area of the screen printing plate and may not penetrate through meshes in the non-pictographic area of the screen printing plate. The screen printing process is well known in the art and thereby detailed description thereof is omitted hereby for clarity purpose. In the embodiments of the present invention, in order that the ink layer 102 has a low light transmittance, the screen printing process may be performed twice with black ink. The ink used in the screen printing process should have a good binding force with the aluminum layer 103 and a high temperature resistance. Preferably, the ink is resistant to a temperature which

is no less than 180°C so as to prevent the ink layer 102 from deformation in the following hot stamping process. And the ink may be any suitable one such as ink products of HAC series, SG740 series, and CAV series.

The hot stamping paper 200 according to embodiments of the present invention may further
5 comprise a pigment layer between the silicone resin layer 202 and the aluminum layer 203. The color of the pigment layer 204 may be any one of silver, gold, red, yellow, blue and green. The base film 201 of the hot stamping paper 200 may be a biaxial stretching film and may be prepared by PET, which has a good tensile property and may not easily deform under high temperature and high pressure. At high temperature, the silicone resin layer 202 may be liquefied quickly to cause
10 the aluminum layer 203 or the pigment layer 204 to peel off the base film 201. The pigment layer 204 comprises synthetic resins and dyes, which is used to provide color and protect the aluminum layer 103 from oxidation. The aluminum layer 203 is formed by vacuum plating aluminum on the base film 201, which may reflect lights to change the color of the pigment layer 204 so as to exhibit metallic luster. The adhesive layer 205 is consisted of methacrylates or shellacs and may
15 belong to a resin adhesive so as to be bound with the hot stamping material, and transfer the pigment layer 204 and the aluminum layer 203 onto the inner surface 1011 of the press key body 101. The hot stamping paper 200 may be commercially available, for example, the hot stamping paper 200 of KPL-08300, KPL-61S, KPL-150, etc. available from Shang Yuan Chao Company LID, Shenzhen, China. In order to obtain the press key having a good transmittance, the light
20 transmittance of the hot stamping paper 200 may be about 20%-40%.

The hot stamping used in some embodiments of the present invention is a process of stamping the hot stamping paper 200 onto the surface of an object, such as the press key 100. The main hot stamping material is electrolytic aluminum, so that the hot stamping process is also referred to as an electrolytic aluminum hot stamping process. The hot stamping process is
25 performed in the hot stamping machine. The molding part of the hot stamping machine is referred to as the hot stamping plate comprising an upper mold and a lower mold. The upper mold is preferably the silicone rubber mold made of the silicone resin with a high temperature resistance and a hardness of 60 -90 degree. The lower mold is the aluminum mold designed with discharging holes to avoid bubbles during hot stamping so as to improve the product yield rate. The hot
30 stamping machine may be commercially available, for example, the hot stamping machine of WHT-2015A3/XT-S available from Ronglong precision machine corporation limited, Dongguan, Guangdong Province, China. The basic procedure of hot stamping according to some embodiments of the present invention is as follows: when the hot stamping paper 200 is pressed by the hot stamping plate and the object such as the press key, the silicone resin layer 202 and the
35 adhesive layer 205 on the electrolytic aluminum may be melted by heating, because the viscosity

of the melted silicone resin layer 202 may become low whereas the viscosity of the special hot-melt adhesive may become high, the aluminum layer 103 may be peeled off the base film 201 and stamped onto the surface of the object such as the press key. With the releasing of the pressure, the adhesive may be cooled and solidified quickly, so as to adhere the aluminum layer 103 onto the surface of the object (the press key), thus finishing the hot stamping process.

During hot stamping, the portion of the upper silicone rubber mold, on which the hot stamping is needed to perform, is convex and the aluminum layer 103 of the hot stamping paper 200 which is stamped by the convex portion may be left on the press key. The hot stamping position may be controlled by designing the concave and convex portions on the upper mold. The hot stamping process is well known in the art, the description of which is omitted hereby for clarity purpose. According to some embodiments of the present invention, the temperature at which the hot stamping process is performed may be about 180-240°C, and the pressure under which the hot stamping process is performed may be adjusted to achieve an excellent hot stamping effect, no indentation on the press key and good adhesive force of the aluminum layer 103. Meanwhile, the hot stamping process may be performed for about 2-6 seconds. If the temperature is too high, the melting is excessive, which may paste the screen, and the over high temperature will cause the product to reduce the luminance and lose the metallic luster, even cause fog porphyritic structure or blistering in the imprint. If the temperature is too low, the melting is not sufficient, which may cause the hot stamping failed or infirm, and the imprint is infirm and easy to drop off, or character patterns may not be integrated and the imprint may not be clear. If the pressure is too high, the product deforms excessively, which may cause wide and even adhesive imprint, and may cause the imprint to paste the screen. If the pressure is too low, the electrolytic aluminum may not be transferred onto the surface of the press key well, which may cause the imprint to breeze and carve the screen. If the time is too long, the hot stamping may be failed or the imprint is not clear. If the time is too short, the hot stamping quality and the production efficiency may be influenced disadvantageously.

After forming the aluminum layer 103, the varnish layer 104 may be formed on the aluminum layer 103 to protect the aluminum layer 103. According to some embodiments of the present invention, the varnish may be INQ-000, or MIB-001 available from SEIKO, Japan.

According to an embodiment of the invention, the method may further comprise a step of disposing an ultraviolet-curing ink layer 102 at the external surface 1012 of the press key 100, which may improve the surface property of the press key 100.

The present invention will be explained in more details with reference to the following embodiments.

Embodiment 1

Embodiment 1 is used to explain the method of the present invention.

Firstly, PC plastics were injection molded into a molded plastic member, the black CAV ink was hollow-out stamped twice on the inner surface 1011 of the molding plastic member, then the hot stamping paper 200 of KPL-150 was selected, the temperature was set to $210\pm 10^{\circ}\text{C}$, and the time was set to $2\pm 1\text{S}$ in the hot stamping machine, so that the plastic member covered by the aluminum layer 103 was prepared. And the press key was formed by printing the INQ-000, MIB-001 varnish of SEIKO, Japan on the inner surface 1011 of the aluminum layer 103, then spraying the colorless and transparent UV paint onto the external surface 1012 of the plastic member, and finally shape-punching to obtain the press key 100.

Comparative Embodiment 1

The press key was form by, firstly, injection molding the PC plastic into a molded plastic member, hollow-out stamping the black CAV ink twice on the inner surface 1011 of the molding plastic member, then performing PVC vacuum coating on the inner surface 1011 of the plastic member to obtain the plastic member covered by the metallic layer, and then printing the MIB-001 varnish of SEIKO, Japan on the inner surface 1011 of the plastic member, spraying the colorless and transparent UV paint onto the external surface 1012 of the plastic member, and finally shape-punching to obtain the press key.

Comparative Embodiment 2

The press key was form by, firstly, injection molding the PC plastic into a molded plastic member, hollow-out stamping the black CAV ink twice on the inner surface of the molding plastic member, then printing the mirror ink onto the inner surface of the molded plastic member, and printing the MIB-001 varnish of SEKIO, Japan on the inner surface of the plastic member, spraying the colorless and transparent UV paint onto the external surface of the plastic, and finally shape-punching to obtain the press key.

Embodiments 4-6

Hereinafter, 100 press keys prepared from Embodiment 1, Comparative Embodiment 1 and comparative Embodiment 2 respectively were subject to appearance inspection and performance inspection respectively, so as to determine the product yield rate and compare the cost accordingly which may be referred to as Embodiment 4, comparative Embodiment 5 and Comparative Embodiment 6. The results thereof were shown in Table 1.

The calculation of the product yield rate may be determined by the follows:

The product yield rate (%)= qualified product number/total product number

The qualified products were those acceptable after the QUV test, the moisture temperature circuit test, the neutral salt fog test, the vibration wear resistance test and the appearance

inspection.

QUV test: 340 nm, 0.63 W/m², UV illumination was performed for 96 hours so as to test the appearance and the function of the samples and confirm that the basic electromechanical properties were not abnormal.

5 Moisture temperature circuit test: the temperature was maintained at 25°C, the humidity was at 95%, the temperature was risen to 55°C and humidity was risen to 93-96% within 3 hours; then the sample was maintained at 55°C for 9 hours, the temperature was lowered to 25°C and the humidity was lowered to 95-100% within 3 hours; and finally the sample at 25°C was maintained for 9 hours to complete a circle. A circle was 24 hours and 5 circles were repeatedly performed, so
10 as to test the appearance and the function of the samples and confirm that the basic electromechanical properties were not abnormal.

Neutral salt fog test: in the test chamber in which the temperature was 35°C, the solution of 5 % NaCl with a PH value of 6.5-7.2 was sprayed for 2 hours, then the samples were stored at a temperature of 40°C and a humidity which is larger than 93% for 168 hours, so as to test the
15 appearance and the function of the samples and confirm that the basic electromechanical properties were not abnormal.

Vibration wear resistance test: the samples were worn on the vibration wear machine, that is to say, the vibration wear with special wear debris imitated the wearing in normal use of the press key. If there were no evident wearing at the corners of samples after 1 hour and there were no
20 evident wearing at the planes of samples after 3 hours, the samples are acceptable.

Appearance inspection: the surface of the samples were observed to find if there are chromatic errors, badly printing phenomena, exposure phenomena of the base materials, deformation phenomena of the characters, excessive printing inks, inadequate printing inks, impurities, color mixing phenomena, scuffing phenomena, line cramping phenomena, black spots,
25 dusts, crooked phenomena, burrs, etc. If there were no above phenomena, the samples thereof are acceptable.

Table 1

	Embodiment 4	Comparative Embodiment 5	Comparative Embodiment 6
Yield	95 %	65 %	70 %
Cost	0.3 RMB	4 RMB	1.5 RMB

From Table 1, it is known that the method of forming the press key according to some embodiments of the present invention improves the product yield rate greatly, for example, more
30 than 95 % and saves the product cost tremendously.

Although explanatory embodiments have been shown and described, it would be appreciated

by those skilled in the art that changes, alternatives, and modifications can be made in the embodiments without departing from spirit and principles of the invention. Such changes, alternatives, and modifications all fall into the scope of the claims and their equivalents.

WHAT IS CLAIMED IS:

1. A press key for an electronic device, comprising:
a press key body;
5 an ink layer formed at an inner surface of the press key body having a hollowed-out portion forming a desired pattern;
an aluminum layer configured to cover at least the hollowed-out portion; and
a varnish layer configured to cover the aluminum layer to protect the aluminum layer.
- 10 2. The press key according to claim 1, further comprising an ultraviolet-curing ink layer disposed at an external surface of the press key body.
3. The press key according to claim 1, wherein the aluminum layer is configured to cover the ink layer.
- 15 4. The press key according to claim 1, wherein the ink layer has a thickness of about 16 μm to about 20 μm and the aluminum layer has a thickness of about 6 μm to about 12 μm .
5. The press key according to claim 1, wherein the desired pattern is a character pattern or figure pattern, and the press key body is made of one or more selected from a group consisting of polycarbonate (PC), acrylonitrile- butadiene- styrene copolymer (ABS), polymethyl methacrylate (PMMA), and polyethylene terephthalate (PET).
- 20 6. A method of forming a press key for an electronic device, comprising steps of:
a) providing a press key body;
b) forming an ink layer at a inner surface of the press key body, in which the ink layer has a hollowed-out portion forming a desired pattern;
c) providing a hot stamping paper comprising a base film, a silicone resin layer, an aluminum layer and an adhesive layer, in which the silicone resin layer, the aluminum layer and the adhesive
30 layer are in turn disposed on the base film;
d) performing a hot stamping with respect to the press key body using the hot stamping paper, in which the aluminum layer of the hot stamping paper is hot-stamped onto the inner surface of the press key body to cover at least the hollowed-out portion of the ink layer; and
e) forming a varnish layer on the aluminum layer.

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7. The method according to claim 6, wherein the ink layer having the hollowed-out portion is formed by screen-printing.

5 8. The method according to claim 6, wherein the hot stamping paper further comprises a pigment layer between the silicone resin layer and the aluminum layer having a color selected from a group consisting of silver, gold, red, yellow, blue and green.

9. The method according to claim 6, wherein the hot stamping paper has a light transmittance of about 20%-40%.

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10. The method according to claim 6, wherein the hot stamping is performed at a temperature of about 180-240°C for about 2-6 seconds.

11. The method according to claim 10, wherein the ink layer is resistant to a temperature
15 which is no less than 180°C.

12. The method according to claim 10, further comprising a step of forming an ultraviolet-curing ink layer at an external surface of the press key body.

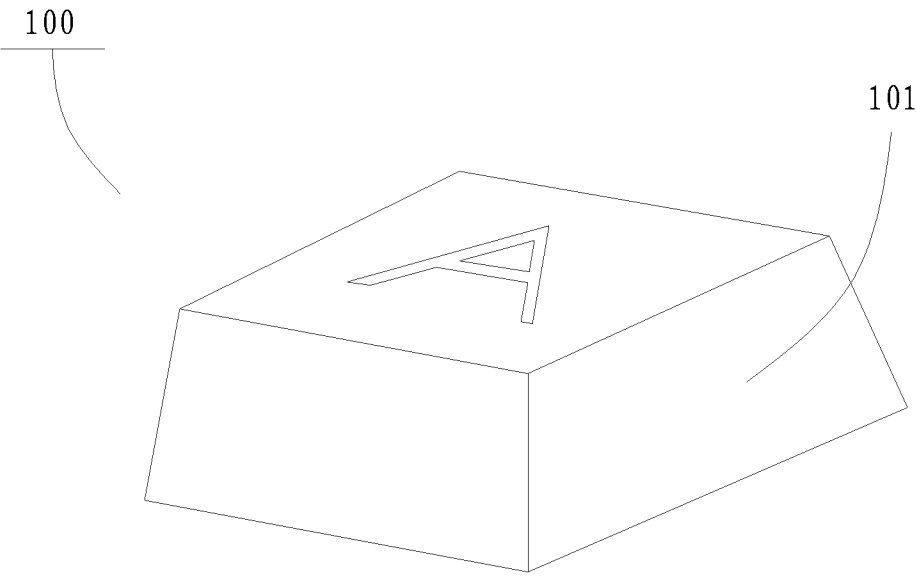


Fig. 1

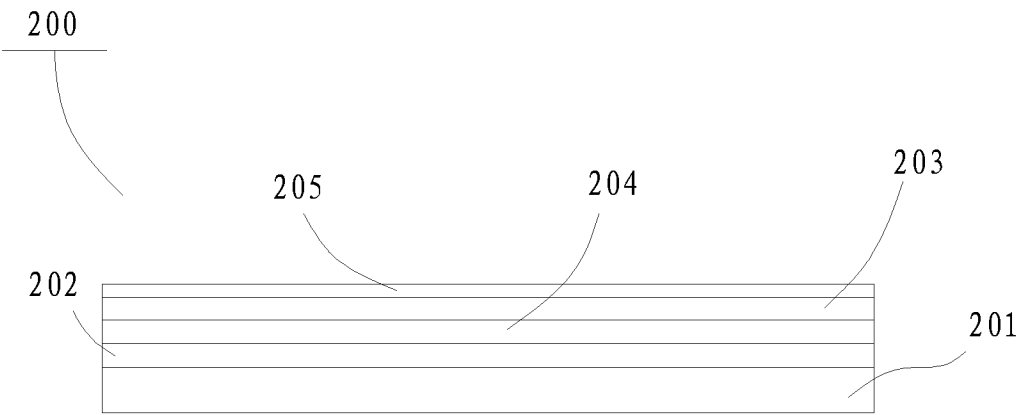


Fig. 2

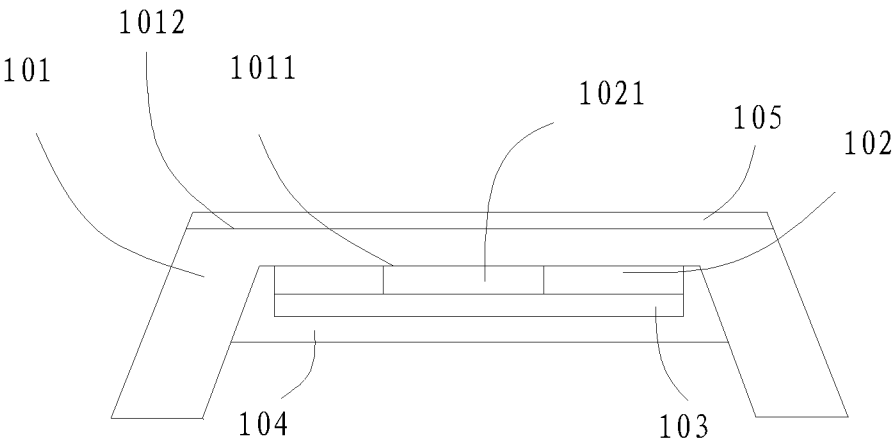


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2010/074531

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H01H 13/-; G06F 3/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRS,CNKI,EPODOC,WPI: key, press+, inner, back, rear, surface, down, lower, aluminum, layer, varnish, dome, top, sheet, shield, pattern, character?, metal+, hot, stamp+, protect+, base w film, UV, ultraviolet, cur+, ink, varnish, thickness, transmittance, light, temperature, pigment

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP2004243565A, (MITSUBISHI PLASTICS IND LTD.), 02 Sep. 2004(02.09.2004), paragraphs [0013] – [0015], [0021], [0026] of the description and Fig. 1(c)	1,2-3,5
Y		4, 6-12
Y	CN1889218A, (LUDIAN HI-NEW TECH CO., LTD.), 03 Jan. 2007(03.01.2007), claims 1,4	4
Y	CN201136348Y, (ZHEN, Hanping), 22 Oct. 2008(22.10.2008), page 2 paragraph [8] to page 3 paragraph [2] of the description and Figs.1, 2	6-12

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
“A” document defining the general state of the art which is not considered to be of particular relevance	“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
“E” earlier application or patent but published on or after the international filing date	“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)	“&” document member of the same patent family
“O” document referring to an oral disclosure, use, exhibition or other means	
“P” document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 01 Sep. 2010(01.09.2010)	Date of mailing of the international search report 08 Oct. 2010 (08.10.2010)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer HANG Xuemeng Telephone No. (86-10)62411713

INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN101026044A, (HONGFUJIN EXACT IND SHENZHEN CO., LTD. et al.), 29 Aug. 2007(29.08.2007), the whole document	1-12

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/074531

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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CN201136348Y	22.10.2008	NONE	
CN101026044A	29.08.2007	US2007/0197008A1	23.08.2007

INTERNATIONAL SEARCH REPORT

International application No.

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CLASSIFICATION OF SUBJECT MATTER:

G06F 3/02 (2006.01) i

H01H 13/14 (2006.01) i