US 20110228192A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2011/0228192 A1**

(43) **Pub. Date: Sep. 22, 2011**

Hollaway

(54) **WATERPROOF TOUCH SCREEN PANEL WITH PROTECTIVE FILM**

(76) Inventor: **Jerrell P. Hollaway**, (US)

(21) Appl. No.: **12/661,530**

(22) Filed: **Mar. 19, 2010**

Publication Classification

(51) **Int. Cl.**

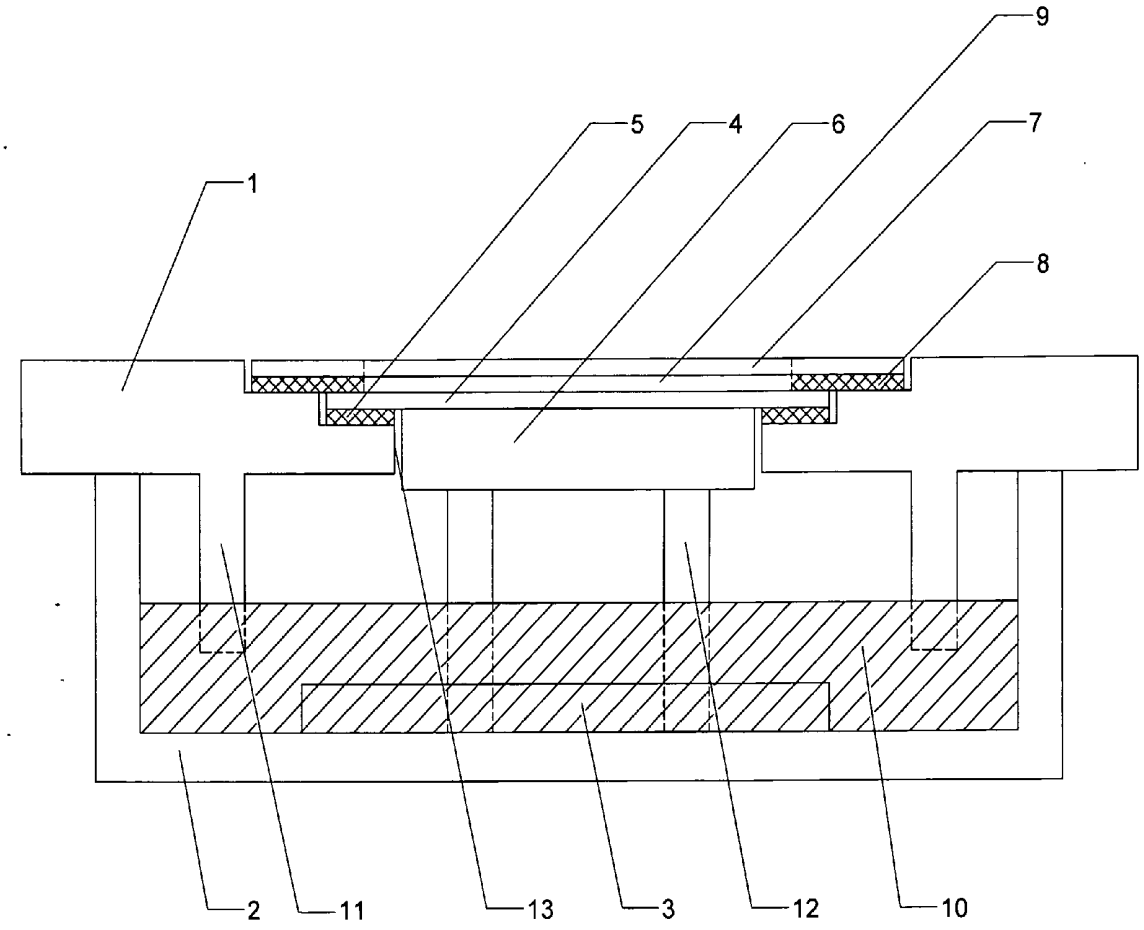
G02F 1/1333 (2006.01)

H01J 9/24 (2006.01)

(52) **U.S. Cl.** **349/58**; 445/24

(57) **ABSTRACT**

A waterproof touch screen user interface panel constructed in such a way that readily available LCD displays and touch screen switches can be used in a wet environment. A thin plastic film is placed over the top of a touch screen/LCD assembly using moisture resistant adhesive to protect the assembly from the panel's top side and a specially constructed housing allows the use of silicon gel to protect the panel from the bottom side. The plastic film, typically a polycarbonate film, is thin enough to allow activation of the touch screen switches with a soft touch, yet rigid enough to prevent false activations of the switches until touched.



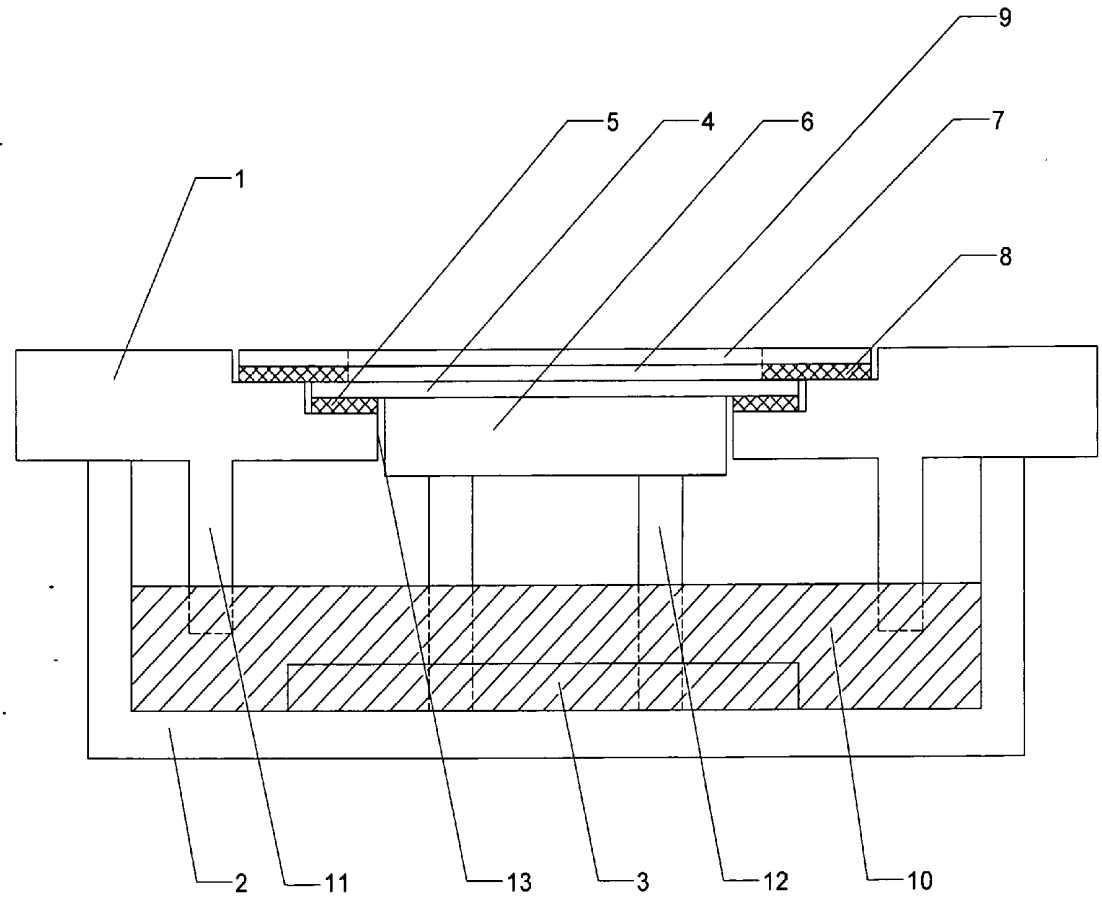


FIG. 1

WATERPROOF TOUCH SCREEN PANEL WITH PROTECTIVE FILM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to touch screen user interface panels and, more particularity, to touch screen panels used in wet environments, such as in spas and hot tubs.

[0003] 2. Discussion of Related Art

[0004] There have been many touch screen products developed for use in wet environments. Most of these products, however, rely on the waterproof construction of the LCD/touch screen assembly for moisture protection. All of these products are expensive to build because of the specialized construction required for the LCD/touch screen assembly.

[0005] Prior to the present invention, few successful efforts have been made to protect an ordinary LCD and touch screen switch from moisture intrusion by the construction of the product's housing.

SUMMARY OF THE INVENTION

[0006] The present invention teaches the use of a protective film over a touch screen to protect against moisture intrusion from the top of the product. The film is carefully chosen to lie flat on the surface of the touch screen and be of a thickness that will allow activation of the touch screen switches with normal pressure.

[0007] In practice, a touch screen switch is positioned and secured over a LCD display, forming an assembly. The LCD/touch screen assembly is then positioned in a special housing that allows the use of conventional sealing materials to protect against moisture intrusion from all directions.

BRIEF DESCRIPTION OF THE DRAWING

[0008] FIG. **1** illustrates the construction of the invention in a cross sectional view.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] Referring now to FIG. **1**, the housing of the product consists of upper housing **1** and lower housing **2**. LCD/touch screen assembly **6** is positioned in contact with, or very near, protective film **4**, which is held in contact with upper housing **1** over cutout area **13** in the housing by means of adhesive layer **5**. Another layer of protection is provided by decorative overlay **7**, which is held in position by adhesive layer **8**. Adhesive layer **8** overlaps the vertical positioning of adhesive layer **5** so that the interface between **1** and **4** is covered.

[0010] Circuit board **3** is positioned and secured to lower housing **2** and electrically coupled to LCD/touch screen assembly **6**. Silicon gel **10** is placed in lower housing **2** to cover circuit board **3**, making circuit board **3** virtually waterproof

[0011] When upper housing **1** and lower housing **2** are jointed together and secured with fasteners, protrusion **11** from upper housing **1** penetrates silicon gel **10**, making the back side of LCD/touch screen **6** also waterproof.

[0012] Protrusion **12** from lower housing **2** holds LCD/touch screen assembly **6** in a secured position.

[0013] In operation, protective film **4** lies directly on top of the touch screen surface of assembly **6**. Film **4** is thin enough to be flexible when lightly touched. A thickness of 0.020 inches is known to work well when the material is polycarbonate. In all cases, the material must be very flat, without high and low spots which could cause false switching. The adhesive material used in **5** and **8** is water resistant. Several foam gasket materials are available, as well as adhesive films, such as 3M 467MP and 468MP. The use of decorative overlay **7** with adhesive layer **8** provides a small air gap **9**, which is The same as the thickness of adhesive layer **8**. This air gap improves the performance of the product in certain environments.

[0014] Additional methods of securing **6** in position with film **4** may be employed. An adhesive material between **6** and **1**, correctly applied, can eliminate the need for protrusion **12** from lower housing **2** to secure LCD/touch screen assembly **6**.

[0015] Lower housing **2** is constructed to allow circuit board **3** to be secured to **2** and covered with sealing material **10**, prior to final assembly of the two housing parts, **1** and **2**. The final seal is made when protrusion **11** from **1** are embedded in sealing material **10**.

[0016] When constructed as described, the user interface panel is waterproof from moisture on the top surface of the panel as well as from moisture from the bottom and sides of the panel, even though the LCD/touch screen assembly is not constructed to be waterproof.

[0017] In another preferred embodiment, the protective film is ultrasonically bonded to the housing. In yet another preferred embodiment, the film is attached with an adhesive material able to fuse plastic materials, such as PVC cement.

[0018] The present invention may be used on spas, hot tubs, baths, swimming pools, steam baths, showers, and similar products.

[0019] Others skilled in the arts may make improvements in what is taught herein without departing from the spirit of the present invention.

I claim:

1. A waterproof user interface panel comprised of:

An LCD display;

A touch screen switch coupled to said LCD display;

A housing for said switch and said display;

And a protective film over said switch and secured to said housing to prevent moisture intrusion into said housing.

2. The panel in claim **1**, wherein said LCD display and said touch screen switch are secured to each other to form an assembly.

3. The panel in claim **1**, wherein said film is secured to said housing with a water resistant adhesive.

4. The panel in claim **1**, wherein said housing is comprised of an upper housing and a lower housing with said LCD and said touch screen switch located in said upper housing and sealing material located in said lower housing.

5. The panel in claim **4**, wherein protrusions of said upper housing contacts said sealing material in said lower housing when said upper and said lower housings are assembled to form a waterproof seal to protect said LCD display and said touch screen switch from external moisture.

6. The panel in claim **4**, wherein said lower housing has protrusions to hold said LCD and said touch screen switch in a fixed position in said upper housing.

7. The panel in claim **1**, wherein said protective film and said housing are covered by a decorative overlay.

8. A method of constructing a moisture proof user interface panel with a touch screen switch and LCD display comprising the steps of:

Securing a plastic film over a cutout area of a housing;

And positioning an LCD/touch screen assembly against said plastic film.

9. The method in claim **8**, wherein said film is secured to said housing by ultrasonic welding.

10. The method in claim **8**, wherein said film is secured to said housing by an adhesive material.

11. The method of claim **8**, wherein said housing is at least partially filled with a moisture resistant sealing material.

12. The method of claim **8**, wherein the interface between said film and said housing is covered by an overlay having an adhesive layer that covers said interface.

* * * * *

专利名称(译)	防水触摸屏面板，带保护膜		
公开(公告)号	US20110228192A1	公开(公告)日	2011-09-22
申请号	US12/661530	申请日	2010-03-19
[标]申请(专利权)人(译)	HOLLAWAY JERRELL P		
申请(专利权)人(译)	HOLLAWAY JERRELL P		
当前申请(专利权)人(译)	HOLLAWAY JERRELL P		
[标]发明人	HOLLAWAY JERRELL P		
发明人	HOLLAWAY, JERRELL P.		
IPC分类号	G02F1/1333 H01J9/24		
CPC分类号	G02F1/133308 G02F2001/133311 G02F1/13338		
其他公开文献	US8294843		
外部链接	Espacenet USPTO		

摘要(译)

防水触摸屏用户界面面板以这样的方式构造，即易于使用的LCD显示器和触摸屏开关可以在潮湿环境中使用。使用防潮粘合剂将薄塑料薄膜放置在触摸屏/ LCD组件的顶部上以保护组件免受面板顶侧的影响，并且特殊构造的外壳允许使用硅胶从底侧保护面板。塑料薄膜，通常是聚碳酸酯薄膜，足够薄，以允许触摸屏开关具有柔和触感，但足够刚性以防止开关的错误激活直到触摸。