

Description

The present invention relates to a liquid crystal display device inserted between a light source and a lens of a slide projector for projecting an image on a liquid crystal display panel onto a screen, according to the preamble of claim 1.

The liquid crystal display device used for the purpose of the projection of the image is classified into two large groups as follows.

(I) A liquid crystal projector having a light source, a lens for magnifying the image, and a liquid crystal display panel integrally assembled in the projector.

(II) A projector having a light source and a lens for magnifying the image, in which a liquid crystal display device is detachably mounted.

Further, the system of (II) is divided into two types.

(II-1) An over head projector (OHP) on which a liquid crystal display device is mounted.

(II-2) A slide projector in which a liquid crystal display device is inserted.

The systems of groups (I) and (II-1) are produced now.

Since, the system of the group (I) has the light source and the lens, manufacturing cost becomes high. Further, the system can not be used for another purpose such as a projector for projecting the slide. Since the system is large in size, it is difficult to improve portability of the system.

For the projector of the group (II-1), a liquid crystal display panel having a large size, such as size A4 must be provided. It is difficult to manufacture such a large liquid crystal display panel, because of difficulties in patterning and in providing a uniform gap between an upper glass and a lower glass of the panel, thereby deteriorating yield of the panel which causes increase of the manufacturing cost.

Japanese Utility Model Application Laid-open Publications 61-119145 and 62-12147 disclose a system of group (II-2).

Fig. 8 shows a conventional liquid crystal display device disclosed in the Japanese Utility Model Application Laid-open Publication 61-119145. The device comprises a projector 600 in which a light source 603 and a plurality of lenses 601 are provided. A liquid crystal display panel module 606 is adapted to attach to the projector 600 and electrically connect thereto through a connector 607 of the module 606 and a connector 604 of the projector 600. The module 606 is illuminated by the light source 603 and an image of the module is magnified by lenses 601 and projected on a screen 610. Since the module 606 can not be attached to an ordinary projector, the projector 600 must be carried together with modules 606.

Figs. 9a and 9b show another conventional device disclosed in the Japanese Utility Model Applica-

tion Laid-open Publication 62-12147. A holder 706 is interposed between a light source 702 and a lens 704 in a projector 700. The holder 706 is adapted to hold a slide film 707 and a liquid crystal display plate 703. The holder 706 attached to the projector 700 is reciprocated in the horizontal direction as shown by arrows a and b in Figs. 9a, so that either of the slide 707 and the plate 703 may be selected.

In the system, since a particular projector is required, an ordinary slide projector can not be used. Consequently, the module and the holder must be carried together with the projector also in this system.

A liquid crystal display device according to the preamble of claim 1 is known from FR-A-2596880. The liquid crystal display panel of this device is held between two frames in a manner similar to ordinary diapositives. The frames together with the held panel can be inserted between the light source and the lens of the projector. The control circuit board is housed in a housing which is arranged separate from the display panel. Accordingly, in this known liquid crystal display device the connecting means must have a length adapted to connect the display panel and the control circuit board remote from the display panel.

The document JP-A-59-116722 shows a liquid crystal display device in which semiconductor LSIs are connected onto a substrate of a liquid crystal display element and the pins are projected from end surfaces of the substrate for the connection with an external circuit. One of the LSIs is for driving the scanning side of a display part and the other LSIs are for driving the signal side of the display part.

From DE-U-8705095 an over head projector is known in which a liquid crystal display panel, a control circuit board having a video connector and a connecting means for connecting said liquid crystal display panel and said control circuit board are integrally arranged in one unit. The unit is a plate which can be laid on the illuminating surface of the over head projector.

It is the object of the present invention to provide a liquid crystal display panel which is improved over the prior art.

This object is solved by the features indicated in claim 1.

In an aspect of the invention, the thickness of the attached portion is smaller than the thickness of the panel housing portion and the thickness of the panel housing portion is smaller than the thickness of the control circuit housing portion.

These and other objects and features of the present invention will become more apparent from the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1a is a front view of a small liquid crystal display device according to the present invention;

Fig. 1b is a top view of the device;
 Fig. 1c is a side view of the device;
 Fig. 1d is a side view of the device;
 Fig. 2 is an enlarged sectional view of the device taken along a line II-II of Fig. 1a;
 Fig. 3 is a schematic view showing an operation of the device;
 Fig. 4a is an explanatory side view showing a part of the device attached to a projector;
 Fig. 4b is a bottom view of the device of Fig. 4a;
 Fig. 5a is a front view showing a liquid crystal display panel of the device;
 Fig. 5b is a top view of the panel;
 Fig. 5c is a side view of the panel;
 Fig. 5d is a sectional view of the panel taken along a line V-V of Fig. 5a;
 Fig. 6 is a schematic front view showing a liquid crystal display panel block;
 Fig. 7 is a schematic front view showing a control circuit board of the device;
 Fig. 8 is a schematic illustration showing a conventional liquid crystal display system; and
 Figs. 9a and 9b are schematic illustrations showing another conventional system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figs. 1a to 1d, a small liquid crystal display device 1 according to the present invention comprises a housing 100 made of plastics having a front cover 110 and a rear cover 130. The housing 100 has a panel housing portion 101 at a lower portion, and a control circuit housing portion 102 at an upper portion, which are longitudinally arranged. A liquid crystal display panel 300 and a control circuit board 400 for controlling the panel 300 are housed in the panel housing portion 101 and the control circuit housing portion 102 as shown by dotted lines of Fig. 1a. As shown in Fig. 1c, a lower part of the rear cover 130 is reduced in thickness to form a thinner panel housing 131. At the panel housing portion 101 of the housing 100, the front cover 110 has a panel housing 111 to form the panel housing portion 101 together with the panel housing 131, in which the liquid crystal display panel 300 is mounted. At the upper portion of the housing 100, the front cover 110 and the rear cover 130 have circuit housings 112 and 132 respectively, in which the control circuit board 400 is mounted.

The panel housing 111 has thin holding portions 113 and 114 formed on opposite sides thereof. The panel housing 131 also has thin holding portions 133 and 134 formed on opposite sides thereof, corresponding to holding portions 113 and 114, respectively.

When the liquid crystal display device 1 is attached to a projector, the device 1 is engaged with the projector at the holding portions 113, 114, 133 and 134,

which will be described hereinafter.

As shown in Fig. 1d, a left side attached portion composed by holding portions 113 and 133 has a thickness t and a right attached portion formed by holding portions 114 and 134 also has a thickness t . The thickness t is about 1 mm which is a minimum to keep the strength of the housing 100. If the thickness t becomes larger than a predetermined value, the liquid crystal display device 1 can not be attached to some types of the projector. Therefore, the thickness t is preferably limited less than 6 mm so as to increase the applicability of the display device 1 to the projector. The width W of the housing at the attached portion is about 50 mm which is normal width of the slide film.

The display device 1 has a power switch button 150 on the circuit housing 112, a dial 170 for controlling luminance of the display panel, which is provided on a right side of the housing 100, and an external connector 160 on the top of the housing 100 for receiving an outside signal.

Fig. 2 shows a part of the liquid crystal display panel 300 and a part of the control circuit board 400 of the liquid crystal display device 1. A panel connecting substrate 200 made of a flexible printed circuit board (FPC) is provided for connecting an internal connector 404 of a control circuit on the circuit board 400 to the liquid crystal display panel 300. Front and rear transparent shielding plates 120 and 140 made of acrylic material are provided in openings formed in the panel housings 111 and 131, respectively, for protecting the display panel 300.

Referring to Figs. 5a to 5c, the liquid crystal display panel 300 comprises a glass 301 having scanning electrodes thereon, a glass 302 having signal electrodes thereon, and liquid crystal injected between glasses 301 and 302 through a hole which is sealed by a plug 307. Since the width W (Fig. 1a) of panel housings 111 and 131 is 50 mm, the width of the glass 301 is smaller than it, for example, L_1 is 35 mm and L_2 is 8 mm. In the present invention, driving circuits for driving the display panel 300 are provided on the glasses 301 and 302 in the form of chips, which is called chip-on-glass (COG) method. The glass 301 has scanning electrode driving circuit chips 303 mounted thereon and input terminals 305 for scanning electrode driving circuit chips 303. The glass 302 has signal electrode driving circuit chips 304 mounted thereon and input terminals 306 for signal electrode driving circuit chips 304. These chips are adhered to the glasses by paste, as described hereinafter. The image is displayed in a region defined by a dot-dash line 308. In the image display region 308, a pitch between electrodes is 45 μ m.

Fig. 5d shows the structure of the signal electrode driving circuit chip 304. The signal electrode driving circuit chip 304 comprises a substrate 304a, a plurality of aluminum pads 311 provided on the substrate 304a, protector films 312 provided for covering

the surface of the substrate 304a except the aluminum pads 311. A bump 314 made of copper is connected to each aluminum pad 311 through a metallic adhesion layer 313. The bump 314 is covered with an oxide film 315 and is adhered to each transparent signal electrode 317 formed on the glass 302 through a paste 316.

Referring to Fig. 6, the input terminals 305 and 306 on the glasses 301 and 302 are connected to the panel connecting substrate 200 by unisotropic conductive adhesive. Thus, a liquid crystal display panel block is formed. The panel connecting substrate 200 is connected to the control circuit board 400 through the internal connector 404 (Fig. 2).

Referring to Fig. 7, the control circuit board 400 has a board 401 on which components of the control circuit board 400 are mounted. The external connector 160 is secured to the board 401 by screws 406 through nuts (not shown). A power switch 402 is connected to the power source button 150. A control circuit chip 403 is provided for processing signals from the external connector 160 and for converting the signals into signals for driving scanning and signal electrode driving circuit chips 303 and 304. The luminance dial 170 and the internal connector 404 are also provided on the board 401. Other components such as chip resistors, chip transistors, chip capacitors (not shown) are mounted on the board 401.

Since the driving circuit chips (303, 304) for driving the signal electrodes and the scanning electrodes are mounted on the glasses 301 and 302, the number of the input terminals 305 and 306 is largely reduced. If the driving circuits are not provided on the glasses and provided on the control circuit board 400, the number of the input terminals largely increases, so that the pitch between the input terminals becomes excessively small. For example, if the liquid crystal display panel 300 has 640 pixels in the row and 480 pixels in the column, the pitch P_i of the input terminals 306 is

$$P_i = L_1/640$$

Since the width L_1 is 35 mm, the pitch P_i becomes

$$P_i = 55 \mu\text{m}$$

It is very difficult to connect input terminals of 640 at pitch of 55 μm to the control circuit. The present invention solves such difficulty and enables the manufacturing of the small display device.

Referring to Fig. 3, a slide projector 500 is an ordinary type, wherein a slide (not shown) is inserted into a slide receiving portion 504 in the vertical direction. In place of the slide, the liquid crystal display device 1 is inserted into the slide receiving portion 504. The external connector 160 of the display device 1 is connected to a connector 511 of a computer 510 through a cable 520. An image signal from the computer 510 is applied to the display device 1 to display an image on the liquid crystal display panel 300. The image on the display panel 300 is illuminated by a

light source 501 and projected on a screen 503 through a magnifying lens 502.

Figs. 4a and 4b show an example of attachment members of the ordinary slide projector for attaching the display device 1 to the projector. In the slide receiving portion 504, a pair of supporting members 251 and 252 and a pair of spring plates 261 and 262 are disposed opposite to each other. When a lower portion of the display device 1 is inserted into the receiving portion 504, the supporting member 251 and the spring plate 261 engage the holding portions 113 and 133, and the supporting member 252 and the spring plate 262 engage the holding portions 114 and 134 to hold the display device 1. Thus, the liquid crystal display device 1 is fixed to the slide projector.

In accordance with the present invention, the panel housing of the liquid crystal display device has thin attached portions at both sides, the thickness of which is less than 6 mm. The width of the panel housing portion is about 50 mm. Thus, the display device can be used in the ordinary slide projector with ease. Consequently, it is very useful at a meeting and others.

The display device is small in size, having a thin thickness and a light weight, thereby increasing the portability. If data are made on a personal computer and written in floppy disks, the user only takes the liquid crystal display device and the floppy disks to an operation place. Thus, it is unnecessary to carry a large projector.

The display device is not provided with the light source and the lens and the display panel thereof is small, thereby reducing the manufacturing cost and increasing the yield. Since the driving circuit chips are directly mounted on glasses of the liquid crystal display panel, the number of connecting terminals is reduced, so that reliability of connections between the terminals and the control circuit and workability of assembling are increased.

While the invention has been described in conjunction with preferred specific embodiment thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims.

Claims

1. A liquid crystal display device comprising a liquid crystal display panel (300) inserted between a light source and a lens of a slide projector for projecting an image on the liquid crystal display panel onto a screen, the slide projector having a slide receiving portion and holder means for holding said liquid crystal display panel, the display device further comprising a control circuit board (400) housed in a control



the surface of the substrate 304a except the aluminum pads 311. A bump 314 made of copper is connected to each aluminum pad 311 through a metallic adhesion layer 313. The bump 314 is covered with an oxide film 315 and is adhered to each transparent signal electrode 317 formed on the glass 302 through a paste 316.

Referring to Fig. 6, the input terminals 305 and 306 on the glasses 301 and 302 are connected to the panel connecting substrate 200 by unisotropic conductive adhesive. Thus, a liquid crystal display panel block is formed. The panel connecting substrate 200 is connected to the control circuit board 400 through the internal connector 404 (Fig. 2).

Referring to Fig. 7, the control circuit board 400 has a board 401 on which components of the control circuit board 400 are mounted. The external connector 160 is secured to the board 401 by screws 406 through nuts (not shown). A power switch 402 is connected to the power source button 150. A control circuit chip 403 is provided for processing signals from the external connector 160 and for converting the signals into signals for driving scanning and signal electrode driving circuit chips 303 and 304. The luminance dial 170 and the internal connector 404 are also provided on the board 401. Other components such as chip resistors, chip transistors, chip capacitors (not shown) are mounted on the board 401.

Since the driving circuit chips (303, 304) for driving the signal electrodes and the scanning electrodes are mounted on the glasses 301 and 302, the number of the input terminals 305 and 306 is largely reduced. If the driving circuits are not provided on the glasses and provided on the control circuit board 400, the number of the input terminals largely increases, so that the pitch between the input terminals becomes excessively small. For example, if the liquid crystal display panel 300 has 640 pixels in the row and 480 pixels in the column, the pitch P_i of the input terminals 306 is

$$P_i = L1/640$$

Since the width $L1$ is 35 mm, the pitch P_i becomes $P_i \approx 55 \mu\text{m}$

It is very difficult to connect input terminals of 640 at pitch of $55 \mu\text{m}$ to the control circuit. The present invention solves such difficulty and enables the manufacturing of the small display device.

Referring to Fig. 3, a slide projector 500 is an ordinary type, wherein a slide (not shown) is inserted into a slide receiving portion 504 in the vertical direction. In place of the slide, the liquid crystal display device 1 is inserted into the slide receiving portion 504. The external connector 160 of the display device 1 is connected to a connector 511 of a computer 510 through a cable 520. An image signal from the computer 510 is applied to the display device 1 to display an image on the liquid crystal display panel 300. The image on the display panel 300 is illuminated by a

light source 501 and projected on a screen 503 through a magnifying lens 502.

Figs. 4a and 4b show an example of attachment members of the ordinary slide projector for attaching the display device 1 to the projector. In the slide receiving portion 504, a pair of supporting members 251 and 252 and a pair of spring plates 261 and 262 are disposed opposite to each other. When a lower portion of the display device 1 is inserted into the receiving portion 504, the supporting member 251 and the spring plate 261 engage the holding portions 113 and 133, and the supporting member 252 and the spring plate 262 engage the holding portions 114 and 134 to hold the display device 1. Thus, the liquid crystal display device 1 is fixed to the slide projector.

In accordance with the present invention, the panel housing of the liquid crystal display device has thin attached portions at both sides, the thickness of which is less than 6 mm. The width of the panel housing portion is about 50 mm. Thus, the display device can be used in the ordinary slide projector with ease. Consequently, it is very useful at a meeting and others.

The display device is small in size, having a thin thickness and a light weight, thereby increasing the portability. If data are made on a personal computer and written in floppy disks, the user only takes the liquid crystal display device and the floppy disks to an operation place. Thus, it is unnecessary to carry a large projector.

The display device is not provided with the light source and the lens and the display panel thereof is small, thereby reducing the manufacturing cost and increasing the yield. Since the driving circuit chips are directly mounted on glasses of the liquid crystal display panel, the number of connecting terminals is reduced, so that reliability of connections between the terminals and the control circuit and workability of assembling are increased.

While the invention has been described in conjunction with preferred specific embodiment thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims.

Claims

1. A liquid crystal display device comprising a liquid crystal display panel (300) inserted between a light source and a lens of a slide projector for projecting an image on the liquid crystal display panel onto a screen, the slide projector having a slide receiving portion and holder means for holding said liquid crystal display panel, the display device further comprising a control circuit board (400) housed in a control



circuit housing (102), and connecting means (200) for connecting said liquid crystal display panel and said control circuit board,

characterised in that

said connecting means comprises driving circuit chips (303, 304) mounted on glassplates which glassplates (301, 302) enclose the liquid crystal of said liquid crystal display panel (300) for driving the liquid crystal display panel (300) and a flexible printed circuit board (200) for connecting an internal connector (404) of a control circuit on the control circuit board (400) to the liquid crystal display panel (300) and the circuit chips thereon, and that

the housing (100) comprises a panel housing portion (101) and a control circuit housing portion (102), said housing (100) having a front cover (110) and a rear cover (130), said control circuit board (400) being housed in said control circuit housing portion (102) constituting said control circuit housing, said liquid crystal display panel being housed in said panel housing portion (101), said panel housing portion (101) being disposed at one end portion of said housing (100) and said control circuit housing portion (102) being disposed at the other end portion of said housing, and said housing portions being longitudinally arranged as a lower and an upper portion; front and rear transparent shielding plates (120, 140) provided in openings formed in the panel housing portion (101) for protecting the liquid crystal display panel (300);

a pair of attached holding portions (113, 133, 114, 134) formed on opposite longitudinal sides of said panel housing portion (101), which are arranged to be inserted into the slide receiving portion (504) of the projector, wherein the thickness of each of said attached portions being less than 6mm, and width of said panel housing portion (101) being about 50mm, so as to allow the display device to be used in an ordinary slide projector, and wherein the height of the housing (100) is higher than the height of said slide receiving portion (504) of the slide projector so that an upper portion of the housing (100) is upwardly projecting from the slide receiving portion (504) when attached.

2. A liquid crystal display device according to claim 1 wherein the thickness of said attached portions (113, 133, 114, 134) is smaller than the thickness of said panel housing portion (101).
3. A liquid crystal display device according to claim 1 wherein the thickness of said panel housing portion (101) is smaller than the thickness of said control circuit housing portion (102).

Patentansprüche

1. Eine Flüssigkristall-Anzeigevorrichtung, die eine Flüssigkristall-Anzeigetafel (300) umfaßt, die zwischen einer Lichtquelle und einer Linse eines Diaprojektors zum Projizieren eines Bildes auf der Flüssigkristall-Anzeigetafel auf einen Schirm eingeführt ist, wobei der Diaprojektor einen Diaaufnahmeteil und Halteeinrichtungen zum Halten der Flüssigkristall-Anzeigetafel aufweist und die Anzeigevorrichtung ferner umfaßt: eine Steuerleiterkarte (400), die in einem Steuerschaltungsgehäuse (102) untergebracht ist, und eine Verbindungseinrichtung (200) zum Verbinden der Flüssigkristall-Anzeigetafel und der Steuerleiterkarte, dadurch gekennzeichnet, daß die Verbindungseinrichtung Treiberschaltungschips (303, 304) die auf den Flüssigkristall einschließenden Glasplatten (301, 302) der Flüssigkristall-Anzeigetafel (300) zum Betreiben der Flüssigkristall-Anzeigetafel (300) montiert sind, und eine flexible gedruckte Leiterkarte (200) zum Verbinden einer inneren Verbindungseinrichtung (404) einer Steuerschaltung auf der Steuerleiterkarte (400) mit der Flüssigkristall-Anzeigetafel (300) und den Schaltungschips darauf umfaßt, und daß das Gehäuse (100) ein Tafelgehäuseteil (101) und ein Steuerschaltungsgehäuseteil (102) umfaßt, wobei das Gehäuse (100) eine vordere Abdeckung (110) und eine hintere Abdeckung (130) aufweist, die Steuerleiterkarte (400) in dem Steuerschaltungsgehäuseteil (102) untergebracht ist, welches das Steuerschaltungsgehäuse bildet, die Flüssigkristall-Anzeigetafel in dem Tafelgehäuse (101) untergebracht ist, der Tafelgehäuseteil (101) an einem Ende des Gehäuses (100) und der Steuerschaltungsgehäuseteil (102) an dem anderen Ende des Gehäuses angeordnet ist, und die Gehäuseteile longitudinal als ein oberer und unterer Teil angeordnet sind; vordere und hintere transparente Abschirmplatten (120, 140), die in Öffnungen vorgesehen sind, welche in dem Tafelgehäuseteil (101) zum Schutz der Flüssigkristall-Anzeigetafel (300) gebildet sind, vorgesehen sind; ein Paar von angehefteten Halterungsteilen (113, 133, 114, 134) vorgesehen ist, die an gegenüberliegenden Längsseiten des Tafelgehäuseteils (101) gebildet sind, welche dazu vorgesehen sind, in dem Diaempfangsteil (504) des Projektors eingesetzt zu werden, die Dicke von jedem der angehefteten Teile kleiner als 6 mm ist und die Breite des Tafelgehäuseteils (101) etwa 50 mm beträgt, um so zu ermöglichen, daß die Anzeigevorrichtung in einem gewöhnlichen Diaprojektor verwendet werden kann, und wobei die



Höhe des Gehäuses (100) größer als die Höhe des Diaempfangsteils (504) des Diaprojektors ist, so daß ein oberer Abschnitt des Gehäuses (100) nach oben von dem Diaempfangsteil (504), wenn es befestigt ist, vorsteht.

2. Eine Flüssigkristall-Anzeigevorrichtung nach Anspruch 1, wobei die Dicke der angehefteten Abschnitte (113, 133, 114, 134) kleiner als die Dicke des Tafelgehäuseteils (101) ist.
3. Eine Flüssigkristall-Anzeigevorrichtung nach Anspruch 1, wobei die Dicke des Tafelgehäuseteils (101) kleiner als die Dicke des Steuerschaltungsgehäuseteils (102) ist.

Revendications

1. Dispositif d'affichage à cristaux liquides comprenant un panneau afficheur à cristaux liquides, inséré entre une source de lumière et une lentille d'un projecteur de diapositives, pour projeter sur un écran une image présente sur le panneau afficheur à cristaux liquides, le projecteur de diapositives ayant une partie réceptrice de diapositives, et
 - un moyen de maintien pour maintenir ledit panneau afficheur à cristaux liquides,
 - le dispositif d'affichage comprenant en outre une carte imprimée de commande (400) logée dans un logement de circuit de commande (102), et
 - un moyen de connexion (200) pour relier ledit panneau afficheur à cristaux liquides et ladite carte imprimée de commande,
 - caractérisé en ce que
 - ledit moyen de connexion, comprend des puces de circuit d'attaque (303, 304) montées sur des plaques de verre, lesquelles plaques de verre (301, 302) renferment le cristal liquide, dudit panneau afficheur à cristaux liquides (300) pour commander le panneau afficheur à cristaux liquides (300) et une carte à circuit imprimé souple (200) pour relier un connecteur interne (404) d'un circuit de commande, présent sur la carte de circuit de commande (400) au panneau afficheur à cristaux liquides (300) et aux puces de circuit présentes sur celui-ci, et en ce que
 - le boîtier (100) comprend une partie logement de panneau (101) et une partie logement de circuit de commande (102), ledit logement (100) ayant un couvercle avant (110) et un couvercle arrière (130), ladite carte de circuit de commande (400) étant logée dans ladite partie logement de circuit de commande (102), constituant ledit logement de circuit de commande, ledit panneau afficheur à cristaux liquides étant logé dans ladite

partie logement de panneau (101), ladite partie logement de panneau (101) étant disposée au niveau d'une partie d'extrémité dudit boîtier (100) et ladite partie logement de circuit de commande (102) étant disposée au niveau de l'autre extrémité dudit boîtier, lesdites parties logement étant disposées longitudinalement en tant que partie inférieure et partie supérieure ;

en ce qu'il est prévu des plaques de protection transparentes avant et arrière (120, 140) placées dans des ouvertures formées dans la partie logement de panneau (101) pour protéger le panneau afficheur à cristaux liquides (300) ;

en ce qu'il est prévu une paire de parties de maintien associées (113, 133, 114, 134) formées sur les côtés longitudinaux opposés de ladite partie logement de panneau (101) et destinées à être introduites dans la partie réceptrice de diapositives (504) du projecteur, l'épaisseur de chacune desdites parties de maintien associées étant inférieure à 6 mm et la largeur de ladite partie logement du panneau (101) étant d'environ 50 mm, de manière à permettre l'utilisation du dispositif d'affichage dans un projecteur ordinaire de diapositives, et la hauteur du boîtier (100) étant supérieure à la hauteur de ladite partie réceptrice de diapositives (504) du projecteur de diapositives de telle manière qu'une partie supérieure du boîtier (100) dépasse vers le haut à partir de la partie réceptrice de diapositives (504) lorsqu'il est mis en place.

2. Dispositif d'affichage à cristaux liquides selon la revendication 1, dans lequel l'épaisseur desdites parties associées (113, 133, 114, 134) est inférieure à l'épaisseur de ladite partie logement de panneau (101).
3. Dispositif afficheur à cristaux liquides selon la revendication 1, dans lequel l'épaisseur de ladite partie logement de panneau (101) est inférieure à l'épaisseur de ladite partie logement de circuit de commande (102).