as disclosed in U.S. Pat. No. 5,537,144 and International Application Serial No. PCT/US97/03985, incorporated herein by reference.

[0408] In general, there are many applications to which the LCD panels of the present invention can be put. One such application is illustrated in **FIG. 15**. As shown, the LCD panel hereof can be integrated into a ultra-high brightness color image projection system of transportable design. In this particular embodiment, the image projection system is embodied within a laptop computer system having both direct and projection viewing modes, similar to the systems described in Applicant's: International Application No. PCT/US96/19718; International Application No. PCT/US95/12846; and International Application No. PCT/US95/05133, each incorporated herein by reference in its entirety.

[0409] As shown in **FIG. 38**, portable image projection system **30** comprises a number of subsystem components, namely: a compact housing of transportable construction having a display portion **31**A with a frontwardly located display window **32**, and a base portion **32**B hingedly connected to the display portion **31**A and having a keypad **33** and a pointing device **34**; an LCD panel **2**, **2**' according to the present invention described above, mounted within the housing display portion **31**A; an ultra-thin projection lens panel **35** (e.g. Fresnel lens, holographic lens, etc.) laminated to the front surface of the LCD panel **2**; a backlighting structure **7**' of cascaded construction, mounted to the rear of the LCD panel **2** in a conventional manner; associated apparatus **36**, (e.g. pixel driver circuitry, image display buffers, an image display controller, a rechargeable battery power supply, input/output circuitry for receiving video input signals from various types of external sources, microprocessor and associated memory, etc.), contained within the base portion **31**B; a projection lens **37** supported by a bracket **38** which can be removed during the direct viewing mode and stored within a compartment **39** formed within the base portion of the housing; and an electro-optically controllable light diffusing panel **40** which does not scatter backprojected light in the projection viewing mode, and scatters back project light in the direct viewing mode.

[0410] In the direct-viewing mode of the system of **FIG. 38**, the projection lens **38** is stored within compartment **39**, electro-optically controllable light diffusing panel **40** is switched to its light scattering state, and the backlighting structure produces light which is spatial-intensity modulated and spectrally filtered to produce color images on the surface of the LCD panel **2**. In the projection-viewing mode, the projection lens **38** is mounted along the projection axis (optical axis) **41** of the Fresnel lens panel **35**, electro-optically controllable light diffusing panel **40** is switched to its light non-scattering state, and the backlighting structure produces light which is spatial-intensity modulated and spectrally filtered to produce color images on the surface of the LCD panel **2**. Projection lens **37** projects the formed color image onto a remote viewing surface **42** for projection viewing. By virtue of the ultra-high light transmission efficiency of the LCD panel **2** hereof, the system of **FIG. 15** can projected bright color images onto remote surfaces without the use of external high-intensity lighting sources required by prior art LCD projection systems. In portable applications, such images can be projected using the battery power source aboard the transportable system. With this design, there is not need for a rearwardly opening window in the back of display housing portion **31**A, required of prior art projection system. When not in use, the system easily folds into a ultra-slim book-like configuration for easy of storage and transportability.

[0411] The CLC filter structures described hereinabove can be assembled as optical devices designed for use in various types of LCD panel systems of the improved image brightness and color qulaity. Several examples of such optical devices and described below.

[0412] **FIG. 39** shows an embodiment of **FIG. 11** where an unpolarized white light **200** is incident on a right handed broadband cholesteric liquid crystal **115** which transmits left handed circularly polarized white incident light and reflects right handed circularly polarized white light. A white matrix is provided by white matrix layer **85** by physically blocking transmission of light into the left handed reflective color filter layers **60** and **70**. After layer **70**, red (R) green (G) and blue (B) left handed circularly polarized light are transmitted as shown above in **FIG. 4** with left handed cholesteric liquid crystal color filter layers **60** and **70**. A quarter wave plate **80** adjacent reflective cholesteric liquid crystal color filters in layer **70** transforms the transmitted left handed circularly polarized light into linearly polarized light, which is used in liquid crystal displays, such as those disclosed in copending Patent Application Ser. No. 08/715,314 entitled "Image Display Panel Recycling Of Light From A Plurality Of Light Reflective Elements Therewithin So As To Produce Color Images With Enhanced Brightness" filed Sep. 16, 1996, which is hereby made a part hereof and incorporated herein by reference.

[0413] **FIG. 40** is similar to **FIG. 5**B1. **FIG. 40** shows an modification of **FIG. 5**B1 where an unpolarized white light **200** is incident on a right handed broadband Cholesteric Liquid Crystal film **115** which transmits left handed circularly polarized white incident light and reflects right handed circularly polarized white incident light. A black matrix is provided by black matrix layer **85** by physically blocking transmission of light into the left handed reflective color filter layers **40** and **50**. After layer **50**, red (R) green (G) and blue (B) left handed circularly polarized light is transmitted as shown above in **FIG. 3** with left handed cholesteric liquid crystal color filter layers **40** and **50**. A quarter wave plate **80** adjacent reflective cholesteric liquid crystal color filters in layer **40** transforms the transmitted left handed circularly polarized light into linearly polarized light, which is used in liquid crystal displays.

[0414] Quarter wave plates can be used to convert circularly polarized light to linearly polarized light for any of the embodiments shown for devices using linearly polarized light, such as displays having twist nematic to turn on and off the light emitting from the pixels in the displays.

[0415] **FIG. 41** shows an embodiment of **FIG. 5** having white unpolarized light **200** incident on a right handed cholesteric liquid crystal layer **115** for transmitting a broad band left handed circularly polarized light covering the primary colors and reflecting the complimentary right handed circularly polarized light. When the green, red (G,R) portion of layer **60** overlaps the blue, green (B,G) portion and the blue (B) portion of layer **70**, a black matrix is created at the overlapped portion, which separates the transmitted colors as described above in **FIG. 5**. The transmitted light from layer **70** then passes through the quarter wave plate **80**