[0060] In an alternative embodiment, the retarder may be omitted altogether. In such embodiments, the light emitted from TOLED directly towards the rear screen (**10**) plus the light reflected from the wire grid polariser is directly reflected by the rear screen (**10**) before being transmitted trough the wire grid polariser and front screen.

[0061] The degree to which the reflected light from the rear display is transmitted through the wire grid polariser depends on its polarisation, which in turn depends on the polarisation of the light incident on the rear screen. A cholesteric rear LCD rear screen behaves essentially as a circular polariser. Consequently, for the three possible polarisations of light incident on the rear screen, the reflected light polarisation is as follows:

[0062] i. the incident light is randomly polarized in which case that which is reflected will be circularly polarized;

[0063] ii. the incident light is linearly polarized in which case it will emerge circularly polarized;

[0064] ii. the incident light is elliptically polarized in which case it will emerge as elliptically polarized.

[0065] The reflected light is able to pass through the wire grid unaffected if its polarisation orientation corresponds with the transmission axis of the wire grid, i.e. linearly polarised.

[0066] If the reflected light is circularly polarised, it is advantageous to use an appropriate retarder to correct the polarisation alignment to match that of the wire grid polariser. Preferably, said screens are liquid crystal displays. However, it will be understood alternative constructions are possible and the invention is not necessarily limited to the use of LCDs.

[0067] The main criteria for the rear display is that it reflect the incident light to at least some degree. Alternatives to LCD displays suitable for this purpose include the recently developed 'electronic paper'. This is an area of considerable interest in display research circles, with the aim of producing a product forming an electronic alternative to conventional paper with a very thin, inexpensive, low power consumption display for text and static images. This electronic paper is intended to provide a product that is addressable in the manner of a desktop display but without the same bulk.

[0068] Technologies involved include interferometric modulators which are formed by a switchable array of optically resonant cavities, micro-encapsulated electrophoretic displays which use electrically controllable pigments as well as well established reflective and transflective liquid crystal technologies.

[0069] These and any other type of display that reflects between 10% and 100% of the incident light would be suitable for use as the rear display in the present invention.

[0070] Consequently, by virtue of incorporating an at least partially transparent emissive layer, a practical multi-focal plane visual display unit such as a PDA may be realised. The transparent properties of the emissive layer permit transflective display constructions to be retained and thus dispensing with the need for additional powered display illumination in conditions of high ambient light. When additional illumination is required indoors, or in low-light environments, the emissive layer provides a low-power means of providing the necessary illumination.

[0071] It will furthermore be appreciated that the above-described configuration using a TOLED as the emissive layer need not necessarily be applied between two display screens. Instead, the configuration may be used as a front illumination means in other single or multi layer displays, either individually, or in combination with other backlight and/or emissive layers located between the displays.

[0072] Thus, according to a further aspect of the present invention there is provided a visual display unit illumination assembly including;

[0073] a polarised transparent organic light emitting diode (TOLED) and a wire grid polariser located between the TOLED and an observer viewing the visual display unit.

[0074] Optionally, said illumination assembly incorporates an optical retarder located between the TOLED and a rear of the display. The degree of retardation (e.g. a quarter wave retarder) may be defined according to variation between the polarisation of the light emitted from the TOLED and reflected from the rear display screen(s) and polarisation transmission axis of the wire grid polariser. It will be appreciated that the degree of retardation provided by optical retarder need be half the total phase shift required, as the light passes through the retarder twice.

[0075] Said illumination assembly may be used in front of a visual display unit comprised of one or more screens, though attenuation of light by successive screens places a limit on the number of screen layers. The illumination assembly may also be located between two screens in a multi-layered display, as described in the above embodiments.

[0076] The visual display unit illumination assembly may thus be fitted to the front of a multi-layered display, such as a two screen LCD display unit as a replacement for a conventional backlight. The illumination assembly may also be used in applications where a user needs to view an object/scene from substantially the same direction as an illumination source directed at the scene/object, e.g. a dentists or jewellers light with a central transparent magnifying section.

[0077] Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

BRIEF DESCRIPTION OF DRAWINGS

[0078] Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the accompanying drawings in which:

[0079] **FIG. 1** shows a schematic cross sectional side elevation through a light pipe backlighting assembly of prior art displays;

[0080] **FIG. 2** shows a plan view of the diffusion dot dispersion pattern distributed on the surface of a light pipe;

[0081] **FIG. 3** shows a schematic composite view of a first preferred embodiment of the present invention;