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(54) Title: DISPLAY PANELS WITH AN INTEGRATED OFF-AXIS MICRO-LENS ARRAY

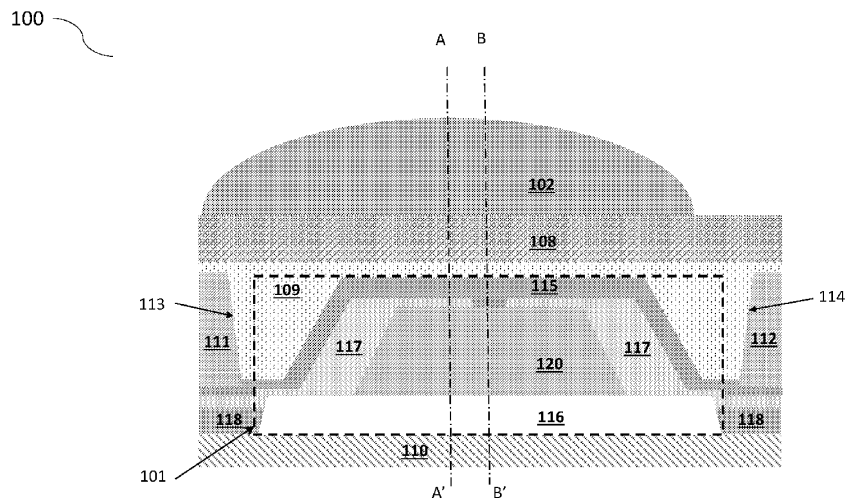


Figure 1A

(57) Abstract: Various embodiments include a display panel with an integrated micro-lens array. The display panel typically includes an array of mesas which includes an array of pixel light sources (e.g., LEDs) electrically coupled to corresponding pixel driver circuits (e.g., FETs). The array of micro-lenses is off-axially arranged on the mesas including the pixel light sources, and are positioned to reduce the divergence of light produced by the pixel light sources, and direct the light to a certain angle or focus point on a pixel by pixel basis. Different micro-lens shapes and combinations are implemented in the display panel. The display panel may also include an integrated optical spacer formed from the same micro-lens material layer to maintain the positioning between the micro-lenses and pixel driver circuits.

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