the case when a touchscreen is to be added to the system, it is typically made as a separate assembly and attached to the display plane in subsequent steps. A resistive touchscreen **30** typically consists of a flexible, transparent, first substrate **41**, a transparent first electrode **31**, transparent spacers **42**, sensing electrodes **33**, a transparent second electrode **32**, and a transparent, second substrate **44**. The electrodes are typically indium tin oxide (ITO) sputter coated onto the substrate. The purpose of the spacers **42** is to keep the electrodes **31**, **32** separated by an air gap **43**. The reason for this will be explained with regard to FIG. **2**.

[**0054**] Although the embodiment shown in FIG. **1** is a resistive touchscreen, a capacitive touchscreen could also be used. Capacitive touchscreens are similar to resistive touchscreens, except they consist of only a single electrode and substrate, with sensing electrodes located in the four corners of the assembly. The electrode for a capacitive touchscreen is typically located such to expose it to the viewer.

[**0055**] FIG. **2** shows a side view of a traditional, resistive touchscreen-display device as known in the art, with the touchscreen activated. An input device **2**, such as a stylus or finger, applies pressure to the first substrate of the touchscreen **41**, causing the substrate and first electrode **31** to deflect until the first electrode **31** comes into contact with the second electrode **32**. As both electrodes **31**, **32** are held at a given voltage, contact between them generates a current. The touchscreen sensing electrodes **33** measure the current generated and calculate the location of the touch, by extrapolating distance from the sensor **33** from a calculation using the sheet resistance of the first and second electrode **31**, **32** materials. In this embodiment, the display **10** is not flexed, and the touchscreen **30** must be at least partially transparent for the display image to be viewed.

[**0056**] In the case that a capacitive touchscreen is used, sensing is done in a slightly different manner. In the capacitive system, the electrode surface is held at a specific voltage. When a conductive input device with some intrinsic capacitance contacts the electrode, the capacitor charges, causing current to flow. The sensors arrayed around the electrode measure this current flow, and calculate the position of the contact. The advantage to this system over the resistive method is that only one electrode and one substrate are required. The disadvantages are that the input device must be conductive and there are a very limited number of protective materials that can be placed over the electrode without interfering with touch input. Additionally, the electronics required to measure the touch are typically more complex than those used in a resistive system.

[**0057**] FIG. **3** is a cross-sectional view of a flexible, single substrate, polymer dispersed liquid crystal (PDLC) display **10** as known in the art. In this embodiment, the display **10** formed from a transparent plastic display substrate **11**, with an active display layer **21**. The active display layer **21** consists of a transparent, first display electrode **25**, a display imaging layer **22**, and a second display electrode **26**. The display imaging layer **22** consists of a layer of polymer dispersed LC droplets, in which the LC material **24** is held in a series of droplets, surrounded by a polymeric shell **23**. The shells **23** form a matrix that maintains the shape of the droplets, the alignment of the LC material **24**, and the overall thickness of the active display layer **22**. The display layer **22** can further consist of a colored layer (not shown) to define the color of the display.

[**0058**] FIG. **4** is a cross-sectional view of a polymer-dispersed display in a flexed position. As can be seen in the figure, because the LC material **24** is held within the polymeric shells **23**, the alignment of the LC and the layer thickness is maintained even during an abrupt flexure imparted by an input device **2** onto the display substrate **11** and the active display layer **21**. This is an important characteristic for creating a simplified touchscreen-display device.

[**0059**] FIGS. **5**, **6**, **7**, and **8** show side views of different embodiments of a combination PDLC media with a resistive or capacitive touchscreen. FIG. **5** shows an assembly of a PDLC display **10** in front of a traditional resistive touchscreen **30** relative to the viewer **1**. In the unactuated position of this embodiment, the first touchscreen electrode **31** is held with a specific gap from the second touchscreen electrode **32**. The gap is maintained by the intrinsic stiffness of the touchscreen first and second substrates **41**, **44** held apart by the spacers **42**. The viewer **1** can enter information into the system via the touchscreen **30** by applying point pressure to the system using an input device **2**, such as a stylus or finger. The point pressure causes the display **10**, the first touchscreen substrate **41**, and the first touchscreen electrode **31** to be deflected until the first touchscreen electrode **31** comes into contact with the second touchscreen electrode **32**. This contact completes a circuit and allows the touch to be sensed, as was described in FIG. **2**. As the display **10** is electrically independent of the touchscreen **30** in this embodiment, it can be written before, during, or after the touch input registers. The display can be written as a result of the touch. The display could also not be written.

[**0060**] The unique pressure and flexure insensitivity of the PDLC display **10** allows a touch-sensing display assembly to be created in this manner, without any additional layers or optical losses due to the touchscreen **30**. In addition, as both the display **10** and touchscreen **30** can be made at least partially flexible, the total assembly can be similarly flexible.

[**0061**] FIG. **6** shows a side view of a similar system to that of FIG. **5**, with a small modification. Because the touchscreen **30** is located behind the display **10**, it can be made non-transparent without any losses to the optical properties of the display. Allowing non-transparent touchscreen materials to be used could yield substantial cost reductions, as the transparent touchscreen electrodes **31**, **32** are frequently expensive. In addition, this may also allow for the first and second touchscreen substrates **41**, **44** to be replaced by combination electrode-substrates, which was infeasible on the traditional configuration, as increased electrode thickness typically equated to reduced transparency.

[**0062**] FIG. **7** shows a side view of an additional refinement, in which the first touchscreen substrate is removed, and the first touchscreen electrode **31** is applied directly to the back of the display layer **10**. If the active display layer **21** ends in a conductive layer, then an insulating layer (not shown) may be required between the display **10** and the first touchscreen electrode **31** to avoid interference between sensing and display writing. Replacing the first touchscreen substrate with the display could enable significant cost and manufacturing advantages, as not only does it reduce the number of parts, but also the first touchscreen electrode **31**, spacers **42**, and sensing electrodes **33**, could all be printed