lead screw **4312** and translates lead screw nut **4322** which is mounted on tray **4320**. Other methods of moving tray **4320** can also be used. As cartridge tray **4320** is retracted from the fully extended position shown in FIG. **43**(*a*), and the tray is pulled into the light-tight enclosure shown in FIG. **43**(*b*), door **4302** closes to provide a light-tight seal to the light tight enclosure.

[0314] Therefore, cartridge reader **4300** is configured to analyze an assay conducted in an assay cartridge and the cartridge reader comprises (a) an enclosure; (b) a cartridge tray for holding a cartridge during analysis in the cartridge reader; (c) a rail in the enclosure, wherein the cartridge tray is mounted on the rail such that the tray can move in and out of the enclosure by moving along the rail; (d) an actuator to move the cartridge tray along the rail; (e) a mounting frame in the enclosure, the mounting frame is configured to align the cartridge with one or more reader components; and (f) an alignment guide attached to the cartridge tray that is configured to engage with and control movement of the mounting frame. Cartridge reader **4300** includes a plurality of reader components, such as bar code reader **4308**, which reads bar codes or other identifying information on the sides of cartridges as the cartridge tray is pulled into the reader. Other reader components present in the light-tight enclosure within cartridge reader **4300** include, but are not limited to, (i) photodiode assembly **4330**, which supports at least one photodiode and aligns it with assay locations in the cartridge (which includes a photodiode optical coupler and shield, **4332**), (ii) mounting frame **4340** on which is mounted ampoule breaking mechanism **4350**, e.g., the ampoule breaker described in FIG. **42**, (iii) electrode contact pin assembly **4355**, which supports the conductive pins making electrical contact to the cartridge electrodes, and (iv) fluidic manifold **4360**. Fluidic manifold **4360** includes fluidic connectors (not shown) that mate to the vent ports in the cartridge when the cartridge is fully inserted, e.g., using gaskets or o-rings to provide leak-free seals. The fluidic manifold is also linked to air cylinder pump **4306**, which provides the pressure/vacuum source for driving fluid motion in the cartridge. Valves in the manifold determine whether a specific vent port on the cartridge is sealed, open to the atmosphere (ambient) or connected to the air cylinder. In one exemplary embodiment, the valves and fluid lines are configured according to the valve diagram in FIG. **37**, which allows all the vent ports to be sealed or opened to ambient pressure and also allows the left waste, right waste, wash buffer and collection component ports, e.g., as described above in connection with cartridge **3700**, to be connected to the air cylinder so as to allow for pushing or pulling of liquids in the cartridge from these ports. Cartridge reader **4300** also includes electronics, such as a micro-processor or computer for controlling the operation of the cartridge reader and a user interface (touch-screen **4304**, a keyboard, a stylus or an electronic mouse). In addition, communication interfaces (RS-232, Ethernet, USB, etc.) may be provided for communicating with a network or Laboratory Information System. The cartridge reader may also provide interfaces to external memory devices such as memory cards, EEPROMs, RFID devices, external hard drives, USB drives, etc. that may be used to import lot-specific parameters, e.g., assay identity information, lot-specific assay thresholds, calibration data, etc., associated with a lot of cartridges. Such memory devices could be provided as a separate component to a kit, e.g., a box containing one or more cartridges could come with one or more memory devices containing lot-specific parameters for the assay cartridges in the box. Alternatively, the memory device could be attached to the cartridge itself and cartridge reader **4300** is configured to read the lot-specific information when assay cartridge **4380** is inserted into the cartridge processing slot of the cartridge reader or into a separate memory reading slot. In this regard, reference is made to U.S. Provisional Application Ser. No. 61/271,873, filed Jul. 27, 2009, the disclosure of which is incorporated by reference herein in its entirety.

[0315] In the embodiment shown in FIGS. **43**(*a*)-(*b*), the mechanical motions needed to properly move and position assay cartridge **4380** and to align reader components, e.g., the ampoule breaking mechanism **4350**, fluidic manifold **4360**, electrode contact assembly **4355** and photodiode assembly **4330**, relative to assay cartridge **4380** are coupled to the linear motion of the cartridge tray **4320**, allowing these operations to be carried out with a single motor **4310**. The mechanical design that properly aligns the components on mounting frame **4340**, including ampoule breaking assembly **4350** and fluidic manifold **4360**, is illustrated in FIGS. **43**(*c*)-**43**(*e*). Mounting frame **4340** includes rollers **4342** that each ride on separate tracks present in track walls **4370** on either side of the mounting frame. Only the track wall on one side of the mounting frame is shown to illustrate the moving components, and although multiple tracks **4370** are shown, a single track with multiple linear or non-linear segments can also be used. The tracks are roughly U-shaped and include, in order moving away from the front of cartridge reader **4300** or door **4302**, an elevated shelf region, a descending sloping region and an extended flat region at the bottom of the U-shaped track. Movement of mounting frame **4340** is driven by alignment guide **4326** mounted on cartridge tray **4320**.

[0316] When the cartridge tray is fully extended as shown in FIGS. **43**(*a*) and **43**(*c*), rollers **4342** of mounting frame **4340** are resting on the elevated shelf positions, keeping the mounting frame **4340** in an elevated position relative to the cartridge in the cartridge tray. As cartridge tray **4320** is initially retracted into cartridge reader **4300**, alignment guide **4326** moves freely along groove **4346** in mounting frame **4340** without contacting or engaging mounting frame **4340**, and the mounting frame remains stationary. As cartridge tray **4320** continues to retract, a vertical tab in alignment guide **4326** contacts pin **4344** mounted on mounting frame **4340** that spans groove **4346** and moves mounting frame **4340** at the same speed as the cartridge tray **4320**. As best shown in FIG. **43**(*d*), rollers **4342** descend along the descending portion of the tracks in the track wall **4370** shown by the oblique arrow. This descending movement causes pin **4344** to descend into a notch in the alignment guide **4326** adjacent to the vertical tab, and thereby provide precise alignment of mounting frame **4340** relative to cartridge tray **4320** along the axis of motion. In other words, at this stage mounting frame **4340** moves closer to cartridge tray **4320**, and when pin **4344** is received within the notch in alignment guide **4326** and releasably held therewithin, the movements of mounting frame **4340** and of cartridge tray **4320** coincide with each other. FIG. **43**(*a*) also shows guide **4328** that is used to guide the cartridge into the tray and ensure that the cartridge can be inserted into the tray only in the correct orientation. When mounting frame **4340** is at its lowest position, ampoule breaking assembly **4350** is properly positioned to break the ampoules in cartridge **4380** present in cartridge tray **4320**; fluidic manifold **4360** is pressed down onto cartridge **4380** to provide leak-free seals to the cartridge vent ports; and elec-