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MULTIPLE LANE EXTRACTION DRAWER

Abstract

An automated analyzer can include a drawer assembly. The drawer assembly can include a two lane drawer comprising a pipette tip station configured to house two pipette tip holders, an extraction container station configured to house two extraction container holders, and an amplification plate station configured to house two amplification plates. The drawer assembly can include an extractor module positioned relative to the extraction container station, wherein the extractor module comprises magnets configured to apply a magnetic field to extraction container holders of the two extraction container holders.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of International Application No. PCT/US2023/078314, filed Nov. 1, 2023, which claims the benefit of U.S. Provisional Application No. 63/422,700, filed Nov. 4, 2022, all of which are hereby incorporated by reference in their entirety.

BACKGROUND

Field

[0002] The technology described herein generally relates to an automated diagnostic analyzer including components thereof. In some aspects, the technology more particularly relates to a multiple lane extraction drawer.

Description of the Related Art

[0003] Diagnostic testing of biological samples is instrumental in the health care industry's efforts to quickly and effectively diagnose and treat disease. Clinical laboratories that perform such diagnostic testing already receive hundreds or thousands of samples on a daily basis with an ever increasing demand. The challenge of managing such large quantities of samples has been assisted by the automation of sample analysis. Automated sample analysis is typically performed by automated analyzers that are commonly self-contained systems which perform multistep processes on the biological samples to obtain diagnostic results.

[0004] Several current automated clinical analyzers offer a user an array of automated tests or assays that can be performed on a provided sample. Additionally, when samples arrive at the laboratory, they are often not ready for analysis. In order to prepare a sample for testing with an automated analyzer, a lab technician typically transfers an aliquot of the sample from a primary container, as received by the laboratory, to a secondary container which is amenable to the analyzer. In addition, the technician typically must know what tests are to be performed on the sample so that the technician can select a test specific reagent or diluent to be paired with the sample. This can be time consuming and can lead to operator error and exposure to communicable diseases.

[0005] Pre-analytical systems meant to help prepare a sample for analysis and further remove the operator from the workflow between the laboratory's receipt of a sample and the analyzer's test results also exist. However, many of these systems still require significant technician involvement, such as: prior to loading samples in the pre-analytical system; after the samples have been prepared by the pre-analytical system; and after the analyzers have completed analysis.

[0006] For example, some pre-analytical systems may automatically transfer an aliquot of sample from a first container to a second container. However, such systems often require a technician to manually match identification codes of the first and second containers prior to loading them into the system, which can be time consuming and is prone to error.

[0007] In addition, many of these systems are not capable of being integrated with one or more analyzers, and, conversely, the analyzers are not capable of being integrated with such systems. In this regard, a technician must be present to manually transfer the samples from the pre-analytical system to an analyzer and from the analyzer to a storage location once analysis is complete. This requires skilled labor to perform menial tasks and can create distractions in that the technician must be ever mindful of the progress of the samples within the pre-analytical system and analyzer so that the technician is prepared to transfer samples when ready in order to minimize downtime.

[0008] Moreover, current pre-analytical systems generally prepare samples at different rates than the analyzers evaluate such samples. This further complicates the integration between pre-analytical systems and analyzers. In this regard, a technician may be required to continuously keep track of samples prepared by the pre-analytical system until a full batch of samples is accumulated for manual transfer to an analyzer. Alternatively, technicians may transfer partial batches to an

analyzer, which can reduce the analyzer's productivity.

[0009] Thus, while current automated pre-analytical systems and analyzers are beneficial to the clinical laboratory, there is room for better integration and automation of various systems.

SUMMARY

[0010] The present disclosure describes devices, systems, and methods for sample processing and analysis.

[0011] In some embodiments, a two lane drawer assembly is provided. The two lane drawer assembly can include a two lane drawer. The two lane drawer can include a pipette tip station configured to house two pipette tip holders. The two lane drawer can include an extraction container station configured to house two extraction container holders. The two lane drawer can include an amplification plate station configured to house two amplification plates. The two lane drawer assembly can include an extractor module positioned relative to the extraction container station. In some embodiments, the extractor module comprises magnets configured to apply a magnetic field to extraction container holders of the two extraction container holders.

[0012] In some embodiments, the extractor module is configured to process samples from the two extraction container holders simultaneously. In some embodiments, the extractor module is configured to move up and down relative to the two extraction container holders. In some embodiments, the extractor module is configured to move up and down along one or more rails. In some embodiments, the two lane drawer comprises a retention feature configured to extend over a portion of the pipette tip station and the extraction container station. In some embodiments, the two lane drawer comprises a latching mechanism comprising a push-to-close latch. In some embodiments, the two lane drawer comprises a kick-out mechanism configured to facilitate the sliding extension of the two lane drawer. In some embodiments, the two lane drawer comprises telescoping slides. In some embodiments, the two lane drawer assembly comprises the two pipette tip holders, the two extraction container holders, and the two amplification plates. In some embodiments, the two lane drawer assembly comprises three of the two lane drawers. In some embodiments, the two lane drawer assembly comprises a tip drawer configured to house five pipette tip holders.

[0013] In some embodiments, a two lane drawer assembly is provided. The two lane drawer assembly can include a two lane drawer. The two lane drawer can include a pipette tip station configured to house two pipette tip holders. The two lane drawer can include an extraction container station configured to house two extraction container holders. The two lane drawer can include an amplification plate station configured to house two amplification plates. The two lane drawer assembly can include an extractor module positioned relative to the extraction container station. In some embodiments, the extractor module comprises magnets configured to apply a magnetic field to extraction container holders of the two extraction container holders.

[0014] In some embodiments, the extractor module is configured to process samples from the one extraction container holder. In some embodiments, the extractor module is configured to move up and down relative to the two extraction container holders. In some embodiments, the extractor module is configured to move up and down along one or more rails. In some embodiments, the two lane drawer comprises a retention feature configured to extend over a portion of the pipette tip station and the extraction container station. In some embodiments, the two lane drawer comprises a latching mechanism comprising a push-to-close latch. In some embodiments, the two lane drawer comprises a kick-out mechanism configured to facilitate the sliding extension of the two lane drawer. In some embodiments, the two lane drawer comprises telescoping slides. In some embodiments, the two lane drawer assembly can include the two pipette tip holders, the two extraction container holders, and the two amplification plates. In some embodiments, the two lane drawer assembly can include three of the two lane drawers. In some embodiments, the two lane drawer assembly can include a tip drawer configured to house five pipette tip holders.

Description

BRIEF DESCRIPTION

[0015] FIG. 1 is a front perspective view of a high-throughput diagnostic system according to an embodiment of the present disclosure.

[0016] FIG. 2 is a front perspective view of an analyzer of the high-throughput diagnostic system of FIG. 1 absent an external housing.

[0017] FIG. 3 is another front perspective view of the analyzer of FIG. 2.

[0018] FIG. 4A-4F are views of a processing deck of the analyzer of the high-throughput diagnostic system of FIG. 1, and components thereof.

[0019] FIGS. 5A-5C are views of an embodiment of a two lane drawer and extractor according to the present disclosure.

[0020] FIGS. 6A-6C are view of the two lane drawer of FIG. 5A in relation to the analyzer according to the present disclosure.

[0021] FIG. 7 is a view of an embodiment of a two lane drawer according to the present disclosure.

[0022] FIG. 8 is a view of an embodiment of a three lane drawer according to the present disclosure.

[0023] FIGS. 9A-9B are views of an embodiment of a six lane drawer and a stationary retention housing according to the present disclosure.

[0024] FIGS. 10A-10C are views of an extractor scissor lift according to the present disclosure.

[0025] FIG. 11 is a view of an extractor pusher according to the present disclosure.

DETAILED DESCRIPTION

[0026] Embodiments of the present disclosure provide devices, systems, and methods capable of processing a sample. In some embodiments, a multi-lane drawer is provided which hold consumables used during processing, such as two or more pipette tip holders, two or more extraction container holders, and two or more amplification plates. An embodiment includes one or more extractor modules configured to apply a magnetic field to extraction containers within the multi-lane drawer. In some embodiments, a plate sealer is provided which seals an amplification plate for processing. As described herein, the multi-lane drawer and the plate sealer can be components of a high-throughput system configured to process a plurality of a samples while reducing technician involvement. The systems described herein can prepare samples for analysis, while automating one or more steps between the receipt of the sample to producing test results.

[0027] FIG. 1 depicts a high-throughput system **00** according to an embodiment of the present disclosure. The high-throughput system **00** can include a first analyzer **2000**. The high-throughput system **00** can include a second analyzer **4000**. The high-throughput system **00** can include any number of analyzers. The high-throughput system **00** can include pre-analytical system **10**. The analyzers **2000**, **4000** and pre-analytical system **10** are modular such that they can be physically connected and disconnected from one another. The analyzers **2000**, **4000** and pre-analytical system **10** are modular such that they can be electronically connected and disconnected from one another. In some embodiments, the analyzers **2000**, **4000** can have the same configuration. The analyzers **2000**, **4000** can have the same function. The analyzers **2000**, **4000** can be duplicates of each other. The pre-analytical system **10** can couple to at least two of the same analyzers. In some embodiments, the analyzers **2000**, **4000** can have a different configuration. The analyzers **2000**, **4000** can have a different function. The analyzers **2000**, **4000** can perform different operations. The analyzers **2000**, **4000** can analyze different assays. The pre-analytical system **10** can couple to at least two different analyzers. The modularity of pre-analytical system **10** allows it to couple to any analyzer so configured. As shown, the first and second analyzers **2000**, **4000** are disposed at opposite sides of pre-analytical system **10** in a linear arrangement. In other embodiments, the pre-analytical system **10** can be disposed at one end of the high-throughput system **00**. The pre-

analytical system **10** and analyzers **2000**, **4000** can be arranged in any physical arrangement. The analyzer **4000** can be coupled to either side of pre-analytical system **10**.

[0028] The pre-analytical system **10** can include a sample container shuttle transport assembly **4250**, shown in FIG. 4A. The sample container shuttle transport assembly **4250** can transfer a sample container to one or more analyzers **2000**, **4000**. The sample container shuttle transport assembly **4250** of pre-analytical system **10** can extend toward analyzer **4000** when analyzer **4000** is located to the left of system **10** (exemplified in FIG. 1). In other embodiments, the sample container shuttle transport assembly **4250** of pre-analytical system **10** can extend toward analyzer **4000** where analyzer **4000** is located to the right of system **10**. In some embodiments, the sample container shuttle transport assembly **4250** ends at the threshold of the analyzers **2000**, **4000**. In other embodiments, the sample container shuttle transport assembly **4250** extends into the analyzers **2000**, **4000**. The analyzer **2000**, **4000** can have a conveyor that can continue the path of a respective shuttle transport assembly **4250** into analyzer **2000**, **4000**. The sample container shuttle transport assembly **4250** can be a rack or carrier structure with a plurality of receptacles, each receptacle sized and configured to receive a sample container. The sample container shuttle transport assembly **4250** can include an actuator which causes movement of the rack or carrier structure. The high-throughput system **00** can include an opening **120** to receive the rack or carrier structure with the plurality of sample containers. The analyzers **2000**, **4000** can include one or more submodules **2110**, **2120**, **2130**. These submodules can be the same or different from each other.

[0029] The high-throughput system **00** can include an overall system display interface **1332**. Data can be entered and viewed through a graphical user interface (“GUI”) which may be displayed on the display interface **1332**. Data can be entered and viewed through a graphical user interface which is specifically associated with analyzer **2000**, **4000**. Data can also be entered from a vision system of a multipurpose robot. Data can also be entered from scanners within pre-analytical system **10**. Data can also be obtained by sensors, such as door sensors, to obtain information regarding certain conditions and activities occurring within analyzer **2000**, **4000**. Data can also be obtained by sensors, such as temperature sensors, to obtain information regarding certain conditions and activities occurring within analyzer **2000**, **4000**. Data can also be obtained about the location of one or more consumables. Data can also be obtained about the location of the sample container.

[0030] The pre-analytical system **10** can be an automated system for pre-analytical processing of sample to be assayed. The analyzer **2000**, **4000** can be a modular system that is configured to operate in cooperation with the pre-analytical system **10**. The analyzer **2000**, **4000** can be configured for modular connectivity to the pre-analytical system **10**. The analyzer **2000**, **4000** can be configured for high-throughput processing and analysis of samples. The analyzer **4000** is described in greater detail below. The analyzer **2000** can include any of the features described herein.

[0031] FIGS. 2 and 3 show the analyzer **4000**. The analyzer **4000** can include a structural frame **4011** comprised of several support components. The support components can be segments of metal tubing, as an example. The frame **4011** is configured to support and define various decks or levels for sample processing and analysis. The decks can include a supplementary deck **4012**. The decks can include a processing deck **4014**. The decks can include a multipurpose robot deck **4016**. The analyzer **4000** can include a housing or shell that surrounds the frame **4011**. The housing is shown in FIG. 1. The analyzer **4000** can include two detectors **4260a**, **4260b**. The detectors **4260a**, **4260b** can be located at opposite ends of analyzer **4000**. The detectors **4260a**, **4260b** can have cavities that face the center of analyzer **4000**. The detectors **4260a**, **4260b** can have a housing that receives a sealed amplification plate **4040**, shown in FIG. 4F. The detectors **4260a**, **4260b** can have a thermocycler that is used to amplify a target analyte within the sealed amplification plate **4040**. The detectors **4260a**, **4260b** can detect the target analyte using a set of illuminators, for example LED lights. The analyzer **4000** can include a plate sealer **4220**. The plate sealer **4220** can seal the

amplification plate **4040**. The analyzer **4000** can include waste **4004** to dispose of the amplification plate **404**. The analyzer **4000** can include a liquid waste repository that receives all liquid waste of the analyzer **4000**. The analyzer can include a multipurpose robot **4300**.

[0032] FIGS. **4A** and **4B** depict the processing deck **4014**. The detectors **4260a**, **4260b** are shown in relation to the processing deck **4014**. The sample container shuttle transport assembly **4250** is also shown, which can transport sample containers into the analyzer **4000**. The processing deck **4014** can include one or more consumable drawers **4120**. In the illustrated embodiments, six consumable drawers **4120** are shown. The processing deck **4014** can include any number of drawers including one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, or any range of two of the foregoing values. Each drawer **4120** includes a single lane of consumables. Each drawer **4120** can hold a pipette tip holder **4060**. Each drawer **4120** can hold an extraction container **4020**. Each drawer **4120** can hold an amplification plate **4040**. In the embodiment depicted, the processing deck **4014** includes six consumable drawer assemblies **4120**. Each drawer **4120** can house the majority of the consumables utilized in an assay workflow.

[0033] The processing deck **4014** can include the plate sealer **4220**. The plate sealer **4220** can have a moveable platform **4224** that receives an amplification plate **4040** and moves the amplification plate **4040** into the plate sealer **4220**. The processing deck **4014** can include one or more orbital shakers **4230**. The orbital shakers **4230** can oscillate one or more sealed amplification plates **4040** in a circular motion to fully rehydrate a dried reagent with an eluted sample within the compartments of the sealed amplification plate **4040**. The processing deck **4014** can include reagent trough assemblies **4050**. The reagent trough assembly **4050** can include troughs that house bulk reagents. The processing deck **4014** can include one or more piercing tools **4240**. The piercing tool **4240** can be shaped to puncture the heavy duty seal of the reagent trough assembly **4050**. The piercing tool **4240** sits within respective nests or carriers **4270**, **4280** toward the center rear of processing deck **4014** until they are used to puncture a reagent trough assembly **4050**. The processing deck **4014** can include one or more waste chutes **4210**. The waste chutes **4210** can extend through processing deck **4014**. The waste chutes **4210** can receive used amplification plates **4040**. The processing deck **4014** can include a tip drawer **4110**. The tip drawer **4110** can house one or more pipette tip holders **4060**. In the illustrated embodiments, the tip drawer **4110** can hold five pipette tip holders **4060**.

[0034] FIG. **4C** depicts a side perspective view of the drawer **4120**. The drawer **4120** can include a housing **4122**. The drawer **4120** can include a pipette tip station **4124**. The drawer **4120** can include an extraction container station **4126**. The drawer **4120** can include an amplification plate station **4128**. The stations **4124**, **4126**, **4128** can be linearly arranged. The pipette tip station **4124** can be near the front of the drawer **4120**. The extraction container station **4126** can be between the pipette tip station **4124** and the amplification plate station **4128**. The amplification plate station **4128** can be near the rear of the drawer **4120**. The drawer **4120** can include other arrangements of the pipette tip station **4124**, the extraction container station **4126**, and the amplification plate station **4128**. The pipette tip station **4124** can be configured to hold the pipette tip holder **4060**. The extraction container station **4126** can be configured to hold the extraction container holder **4020**. The amplification plate station **4128** can be configured to hold the amplification plate **4040**. The drawer **4120** can be considered a one lane drawer. The drawer **4120** can hold a single pipette tip holder **4060**. The drawer **4120** can hold a single extraction container holder **4020**. The drawer **4120** can hold a single amplification plate **4040**.

[0035] The drawer **4120** can be configured to include an extractor module **4125**. The extractor module **4125** can be disposed within the housing **4122** of the drawer **4120**. The extractor module **4125** can include one or more magnets. The magnets can be mounted to a plate or platform of the extractor module **4125**. The magnets can be mounted in horizontal rows. The magnets can be disposed on either side of the extraction containers within the extraction container holder **4020**. The extractor module **4125** can provide a movable magnetic field that is utilized to extract

polynucleotides, such as DNA, from the samples. The extractor module **4125** can be housed in the consumable drawer **4120** beneath extractor container station **4126**. The extractor module **4125** can be selectively moveable in an up-down direction along one or more rails **4127**. The rails **4127** can be disposed on one or more sidewalls separating compartments beneath each of stations **4124**, **4126** and **4128**. The extractor module **4125** is in an up or extraction position in FIG. **4C**. The extractor module **4125** can be lowered by movement along the rails **4127**.

[0036] The drawer **4120** can include a hinged retention feature **4121**. The retention feature **4121** can rotate about a hinge **4123**. The retention feature **4121** can be a spring-loaded arm. The retention feature **4121** can be hingedly connected to housing **4122**. The retention feature **4121** can be connected immediately behind the extraction container station **4126**. The retention feature **4121** can have a retention position and consumable replacement position. In the retention position, as shown in FIG. **4C**, the retention feature **4121** extends over the pipette tip station **4124** and the extraction container station **4126**. The retention feature **4121** can include an opening allowing access to the pipettes within the pipette tip holder **4060**. The retention feature **4121** can include an opening allowing access to the extraction containers within the extraction container holder **4020**. In this position, the retention feature **4121** is configured to encompass the perimeter of the pipette tip holder **4060** located in the pipette tip station **4124**. In this position, the retention feature **4121** is configured to encompass the perimeter of the extraction container holder **4020** located in the extraction container station **4126**. The retention feature **4121** encompasses the perimeters while allowing access thereto via openings in retention feature **4121**. The retention feature **4121** secures the edges of the pipette tip holder **4060**. The retention feature **4121** secures the edges of the extraction container holder **4020**. The retention feature **4121** limits or prevents the extraction container holder **4020** and the pipette tip holder **4060** from being inadvertently moved during operation. The retention feature **4121** limits or prevents liftoff during pipetting operations. When the consumables in the drawer **4120** need to be replaced, the drawer **4120** can be extended from the front of the analyzer **4000**. In some embodiments, a feature configured to lock the retention feature **4121** in the retention position is released when the drawer **4120** is extended. Under the bias of a torsion spring located within hinge **4123**, the retention feature **4121** rotates about hinge **4123** to the consumable replacement position which provides clearance for a user to replenish consumables within the drawer **4120**.

[0037] Referring back to FIG. **4A**, the drawers **4120** sit at the front of analyzer **4000**. The drawers **4120** can be disposed between the detectors **4260a**, **4260b**. The drawers **4120** can include a visual indicator, such as a colored LED, on a front end thereof that indicates status of the drawer **4120** to a user. The visual indicator can let a user know that the drawer **4120** is currently being used. The visual indicator can let a user know that the drawer **4120** is ready to be used. The visual indicator can let a user know that the drawer **4120** needs replenishing with consumables.

[0038] FIGS. **4D-4E** show the extraction container holder **4020**. The extraction container holder **4020** can be a multi-layer structure. The extraction container holder **4020** can include a lower portion **4025** with a plurality of openings **4029**. The lower portion **4025** can include one or more features **4028**. The features **4028** on sidewalls **4027** of the lower portion **4025** can provide an interference fit with features on the drawer **4120** of analyzer **4000**. The extraction container holder **4020** can include a plurality of extraction containers **4026**. The extraction containers **4026** can be connected via one or more foil strips **4023**. The foil strip **4023** is penetrable with a pipette tip prior to the addition of a sample. Each extraction container **4026** may contain Ferric Oxide (“FOX”) particles to extract polynucleotides such as DNA from samples. The extraction container holder **4020** can include an upper portion **4022** with a plurality of openings **4021**. The strip **4023** can be aligned within the openings **4021**. The upper portion **4022** can include one or more ribs **4024**. The ribs **4024** can extend in a direction transverse to the foil strips **4023** of the extraction containers **4026**. The ribs **4024** can provide structural stiffness to extraction container holder **4020**. The lower portion **4025** allows the extraction containers **4026** to partially extend there through. The extraction

containers **4026** extend through the extraction container holder **4020** to allow processing by the extractor module **4125**. A barcode can be located on upper portion **4022** which helps track information such as lot, expiration date, and serial number of the contents of the extraction containers **4026**. The extraction container holder **4020** can be assembled with enough extraction containers **4026** to perform a single run. In the embodiment depicted, the extraction container holder **4020** can house **32** extraction containers **4026**. The extraction containers **4026** can be arranged along four foil strips **4023**. The extraction containers **4026** can be arranged in a grid. [0039] The pipette tips are provided in the pipette tip holder **4060**. The pipette tip holder **4060** can be configured to house **96** pipette tips. The pipette tips can be arranged in a grid. In some embodiments of the analyzer **4000**, four 1000- μ L tips are used to process each sample. In addition, a single reagent pipette tip can be used with each batch of samples. This helps reduce the number of tips utilized as the reagent pipette tip does not come into direct contact with samples.

[0040] FIG. **4F** shows the amplification plate **4040**. The amplification plate **4040** can include a plate body **4041**. The plate body **4041** can include one or more engagement openings **4044a**, **4044b** that extend into respective sides **4042a**, **4042b** of the body **4041**. The engagement openings **4044a**, **4044b** can allow a gripper of the multipurpose robot **4300** to engage amplification plate assembly **4040** from opposing sides thereof. For example, the openings **4044a** extend through the side **4042a** and a side directly opposite that of the side **4042a**. In addition, the openings **4044b** extend through the side **4042b** and through a side directly opposite that of the side **4042b**. These openings allow the multipurpose robot **4300** to grip and lift the amplification plate **4040** while the amplification plate **4040** is in different orientations. The plate body **4041** can include a plurality of wells that define amplification compartments **4045**. The compartments **4054** can be provided with dried reagents that are utilized for amplification of a target. The amplification plate **4040** can have a visual identification of the reagents contained in compartments **4045** of the amplification plate **4040**, such as a color coding.

[0041] When each drawer **4120** is extend from the analyzer **4000**, the user removes and replaces the used amplification container holders **4020** and empty tip holders **4060**. The user also adds an unused amplification plate **4040** to the drawer **4120**. Once drawer **4120** is reinserted, the instrument **00** can inventory that particular drawer **4120** to check for loading errors. The instrument **00** can be updated to indicate the drawer **4120** as ready for an extraction.

[0042] Referring back to FIG. **4A**, the processing deck **4014** also includes the tip drawer **4110**. The tip drawer **4110** can configured to hold one or more pipette tip holders **4060**. The tip drawer **4110** can house five pipette tip holder **4060**. Each pipette tip holder **4060** can be a 96-well tip carrier. The tip drawer **4110** can be similarly constructed to the drawers **4120** in that it includes visual indicators on a front end thereof. The pipette tip holders **4060** in the tip drawer **4110** can provide the pipette tip utilized for each sample extraction conducted in the consumable drawers **4120**, along with reagent tips and any excess tips that may be needed due to pick-up failures or clogs. The tip drawer **4110** can be disposed to the left of the consumable drawers **4120**.

[0043] These drawers **4110**, **4120** can be accessed from the front of analyzer **4000** by a user. The access to the drawers **4110**, **4120** can be automated. The tip drawer **4110** can be automatically locked or unlocked by analyzer **4000**. The tip drawer **4110** can be locked or unlocked depending on the present status of the tip drawer **4110**. The tip drawer **4110** can be locked or unlocked depending on the present status of the analyzer **4000**. Each drawer **4120** can be automatically locked or unlocked by analyzer **4000**. Each drawer **4120** can be locked or unlocked depending on the present status of the drawer **4110**. Each drawer **4120** can be locked or unlocked depending on the present status of the analyzer **4000**. The tip drawer **4110** and the one or more drawers **4120** can be locked and unlocked simultaneously. The tip drawer **4110** and the one or more drawers **4120** can be locked and unlocked independently. The drawer **4110**, **4120** can include a latching feature that locks the drawer **4110**, **4120** in the fully open position. The drawer **4110**, **4120** can include a latching feature that locks the drawer **4110**, **4120** in the fully closed position. The drawer **4110**, **4120** can include a

latching feature that locks the drawer **4110**, **4120** in both the fully open position and the fully closed position. The latching mechanism can be a push-to-close latch. The latching mechanism can be fully closed by a simple push or other action of the user. The latching mechanism can be spring loaded. The latching mechanism can hold the drawer **4110**, **4120** securely within the analyzer **4000**. The latching mechanism can be built-in. The latching mechanism can include a trigger that is biased toward a locking configuration. The trigger can be depressed to unlock the drawer. The trigger can be depressed automatically by a module of the analyzer **400**. The trigger can be depressed by a user. The drawer **4120** can be considered a single lane drawer. The drawer **4120** can include one latching mechanism to lock and unlock the drawer **4120**.

[0044] Referring back to FIG. 2, the supplementary deck **4012** is disposed adjacent the bottom of analyzer **4000** and is located beneath processing deck **4014**. The supplementary deck **4012** houses electronic components and waste repositories. For example, supplementary deck **4012** can include the liquid waste repository **4002** that receives and houses all liquid waste, such as from the extraction containers **4026** during extraction processes and from the trough assembly **4050** during an emptying process. The supplementary deck **4012** also includes one or more waste repositories **4004** that sit below each of waste chutes **4210** that extend through processing deck **4014**, as shown in FIG. 4A. For example, a single waste repository **4004** may be located under waste chutes **4210** and may collect all solid waste. In another example, two waste repositories **4004** may be used to collect used pipette tips and used amplification plates **4040**, respectively. Each waste repository **4004** may contain a sensing apparatus for detecting waste level. The sensing apparatus can include an optical or ultrasonic sensor, for example.

[0045] In the embodiment depicted, the processing deck **4014** includes six consumable drawer assemblies **4120**. Each drawer assembly **4120** is a single lane drawer. There are a total of six drawers **4120**. In some cases, this drawer arrangement increases cost and there is a need to reduce costs. In some cases, this drawer arrangement is complex to manufacture or service and there is a need to reduce complexity in manufacturing and service. For example, each drawer **4120** includes its own extractor module **4125**. For another example, each drawer **4120** includes its own latching feature. There is a need to reduce components and thus costs related to the drawer assemblies. The drawers described herein can include any of the features of the drawer **4120**.

[0046] FIGS. 5A-5C are views of an embodiment of a two lane drawer **4130** and corresponding extractor module **4135** according to the present disclosure. The two lane drawer **4130** can include any of the features of the drawer **4120**. The two lane drawer **4130** can include advantageous features. The two lane drawer **4130** can be more cost effective. The two lane drawer **4130** can hold the same number of consumables as two of the drawers **4120**. The two lane drawer **4130** can advantageously have only one extractor module **4135**. The two lane drawer **4130** can advantageously have only one set of telescoping slides to facilitate the movement of the two lane drawer **4130**. The two lane drawer **4130** can advantageously have only one indicator related to the use of the two lane drawer **4130**. The two lane drawer **4130** can advantageously have only one latching feature that prevents withdrawal of the two lane drawer **4130** during use. The two lane drawer **4130** can advantageously have only one retention feature to retain the consumables within the two lane drawer **4130**. Referring back to FIG. 4A, the analyzer **4000** can include six lanes of consumables with six drawers **4120**, six corresponding extractor modules **4125**, and six corresponding latching mechanisms. With the two lane drawer **4130**, the same analyzer **4000** can hold six lanes of consumables but with only three of the two lane drawers **4130**, three extractor modules **4135**, and three corresponding latching mechanisms. The two lane drawer **4130** can reduce the number of parts. The two lane drawer **4130** can reduce costs. The two lane drawer **4130** can reduce complexity in manufacturing and servicing. The two lane drawer **4130** does not impact total throughput since the number of consumables is the same, and thus the number of samples processed is the same. The two lane drawer **4130** does not impact customer walk-away time since the number of consumables is the same, and thus the number of samples processed is the

same.

[0047] The two lane drawer **4130** is configured to house the majority of the consumables utilized in an assay workflow. The two lane drawer **4130** can include a pipette tip station **4134**. The two lane drawer **4130** can include an extraction container station **4136**. The two lane drawer **4130** can include an amplification plate station **4138**. The pipette tip station **4134** is configured to hold two pipette tip holders **4060**. The extraction container station **4136** is configured to hold two extraction container holders **4020**. The amplification plate station **4138** is configured to hold two amplification plates **4040**. The two lane drawer **4130** can be configured to hold the same types of consumables described herein. The two lane drawer **4130** can hold twice the number of consumables as the drawer **4120**.

[0048] The stations **4134**, **4136**, **4138** can be arranged linearly. The arrangement can be from front to back, the pipette tip station **4134** in the front, the extraction container station **4136** in the middle, and the amplification plate station **4138** in the back. The two lane drawer **4130** can hold two pipette tip holders **4060** side-by-side in the front. The two lane drawer **4130** can hold two extraction container holders **4020** side-by-side in the middle. The two lane drawer **4130** can hold two amplification plates **4040** side-by-side in the back.

[0049] The arrangement can allow the consumables to interface with other components of the analyzer **4000**. The analyzer **4000** can include three of the two lane drawers **4130**. The two lane drawers **4130** can sit at the front of analyzer **4000** between two detector **4260a**, **4260b**. The extraction container station **4136** can facilitate the extraction of polynucleotides from samples. The extraction container station **4136** can be located in relation to the extractor module **4135**. Once extraction is finished, the extracted polynucleotides in the extraction containers **4026** are used to rehydrate a reagent, for example a master mix reagent, in one of the amplification plates **4040** in the amplification plate station **4138**. The amplification plates **4040** can be prepared for amplification, such as PCR. The prepared amplification plates **4040** can be moved to the appropriate reader **4260a**, **4260b**. This process can be achieved through use of multifunctional robot **4300**, the plate sealer **4220**, and orbital mixer **4230**. The two lane drawer **4130** can include a visual indicator that indicates the current status of the two lane drawer **4130**.

[0050] The two lane drawer **4130** houses the extractor module **4135** within a housing **4132**. The two lane drawer **4130** can include one extractor module **4135**. In some embodiments, the extractor module **4135** can process samples from two lanes simultaneously. In some embodiments, the extractor module **4135** can process samples from two extraction container holders **4020** simultaneously. In some embodiments, the extractor module **4135** can process twice the number of samples as the extractor module **4125**. The extractor module **4135** can move up and down relative to two extraction container holders **4020** simultaneously. In some embodiments, the extractor module **4135** can process samples from two lanes sequentially, for instance, depending on when samples are inserted into the extraction containers **4026**. In some embodiments, the extractor module **4135** can process samples from two extraction container holders **4020** sequentially. In some embodiments, the extractor module **4135** can process samples from two lanes independently, for instance, depending on when samples are inserted into the extraction containers **4026**. In some embodiments, the extractor module **4135** can process samples from two extraction container holders **4020** independently. In some embodiments, pipettors are only extracting polynucleotides from one of the extraction container holders **4020**. In some embodiments, the workflow does not process samples from two extraction container holders **4020**. The software can be limited to processing one extraction container holder **4020**. The pipettors can be limited to processing one extraction container holder **4020**. The instrument can be limited to processing one extraction container holder **4020**. The workflow timing can be limited to processing one extraction container holder **4020**.

[0051] The extractor module **4135** includes magnets **4136**. The magnets **4136** can be arranged to apply a magnetic field on opposite sides of extraction containers. The magnets **4136** provide the

magnetic field that is utilized to extract polynucleotides from the samples. The extractor module **4135** is movable vertically. The extractor module **4135** can move the magnets **4136**, and thus the corresponding magnetic field relative to the extraction containers **4026** of the two extraction container holders **4020** located in the extraction container station **4136**. The extractor module **4135** can be positioned beneath the extractor container station **4136**. The extractor module **4135** can be selectively moveable in an up-down direction along one or more rails **4137**. The rail **4137** can be disposed on a sidewall separating the extraction container station **4136** and the amplification plate station **4138**. As depicted in FIG. 5C, the extractor module **4135** is in an extended position. The magnets **4136** can be near the extraction containers **4026**. The extractor module **4135** can be lowered to be below the extraction containers **4026**. The extractor module **4135** is housed in the two lane drawer **4130**. In some embodiments, the analyzer **4000** can include three of the two lane drawers **4130** and three extractor modules **4135**.

[0052] This movement of magnets **4136** of the extractor module **4135** can facilitate processing of samples. To help isolate the polynucleotides that are extracted from the sample, the polynucleotides can bound to ferric oxide (“FOX”) particles located within the extraction containers **4026**. The particles allow for the magnetic capture of the polynucleotides. This enables the polynucleotides to be isolated from the rest of the unwanted sample, which can be washed away from the eluate using a wash buffer located in the trough assembly **4050**. In order to perform this isolation, a magnetic field is applied to the extraction containers **4026** of the two extraction container holders **4020**. The magnetic field is applied through the use of the extractor module **4135**. The extractor module **4135** includes magnets **4136** positioned to ensure that each row of extraction containers **4026** is subjected to the magnetic field. In some embodiments, magnets **4136** are disposed on both sides of the extraction container **4026**. The magnets **4136** are selectively moved from a position entirely below the extraction containers **4026** to a position adjacent to the extraction containers **4026**. In some embodiments, the magnets **4136** can generally lie in a plane. The extraction containers **4026** can intersect that plane in an extraction mode. The extraction containers **4026** can be entirely below the plane in other modes. In some embodiments, the magnets **4136** overlap with the extraction containers **4026**. The extractor module **4135** applies the magnetic field which captures the bound polynucleotides to a side of the extraction containers **4026**.

[0053] The two lane drawer **4130** can include a hinged retention feature **4131**. The retention feature **4131** can be a spring loaded plate. The retention feature **4131** can be hingedly connected to the housing **4132**. The hinge **4133** of the retention feature **4131** can be positioned behind extraction container station **4136**. The hinge **4133** of the retention feature **4131** can be positioned in front of the amplification plate station **4138**. The retention feature **4131** has a retention position and consumable replacement position. In the retention position, as shown in FIG. 5A, the retention feature **4131** extends over the pipette tip station **4134** and the extraction container station **4136**. In this position, the retention feature **4131** is configured to extend over at least a portion of the two pipette tip holders **4060** and the two extraction container holders **4020** that are located in the pipette tip station **4134** and the extraction container station **4136**, respectively. The retention feature **4131** can cover the perimeter of the two pipette tip holders **4060** and the perimeter the two extraction container holders **4020** while allowing access thereto via openings in retention feature **4131**. The retention feature **4131** functions as a cover to limit movement of the two extraction container holders **4020** and the two pipette tip holders **4060** during operation, such as pipetting operations. The hinged retention feature **4131** can include a locking feature that locks retention feature **4131** in the retention position.

[0054] When consumables in the two lane drawer **4130** need to be removed and replaced with new consumables, the two lane drawer **4130** can be extended. The locking feature that locks retention feature **4131** in the retention position can be released upon extension of the two lane drawer **4130**. The locking feature that locks retention feature **4131** in the retention position can be a magnet. When the two lane drawer **4130** is open, the retention feature **4131** can also be lifted. The retention

feature **4131** is not dependent on the extension of the two lane drawer **4130**. Under the bias of a torsion spring, the retention feature **4131** can rotate about the hinge **4133** to the consumable replacement position. The consumable replacement position opens the retention feature **4131** to provide clearance for a user to replenish consumables within the two lane drawer **4130**. The two lane drawer **4130** can be extended along telescoping slides. The two lane drawer **4130** can include an assembly of extensions that slide relative to each other. The slides can be metal. The slides can include ball bearings. The slides can be full extension slides. The slides can extend in sections. The slides can extend in stages. The housing **4132** of the two lane drawer **4130** can include tab and slot weldments. The tab and slot arrangement can join one surface to another through an elongated hole.

[0055] The two lane drawer **4130** can include a latching feature that locks the two lane drawer **4130** to prevent extension of the two lane drawer **4130** from the analyzer **400**. The two lane drawer **4130** can including a latching feature that locks the two lane drawer **4130** in the fully open position. The two lane drawer **4130** can including a latching feature that locks the two lane drawer **4130** in the fully closed position. The latching mechanism can be a push-to-close latch. In some embodiments, the latching mechanism does not lock in the open position. In some embodiments, the latching mechanism does not accommodate being locked in the open position. In some embodiments, the latching mechanism can be locked in the open position with different telescoping slides. The latching mechanism can be fully closed by a simple push or other action of the user. The latching mechanism can be spring loaded. The latching mechanism can hold the two lane drawer **4130** securely within the analyzer **4000**. The latching mechanism can be built-in. The latching mechanism can include a trigger that is biased toward a locking configuration. The trigger can be depressed to unlock the drawer. The trigger can be depressed automatically by a module of the analyzer **4000**. The trigger can be depressed by a user. The two lane drawer **4130** can include one latching mechanism to lock and unlock the two lane drawer **4130**.

[0056] The two lane drawer **4130** can include a kick out mechanism. The kick-out mechanism can facilitate the sliding extension of the two lane drawer **4130**. The kick-out mechanism can extend along the bottom of the two lane drawer **4130**. The purpose of the kick-out mechanism can be to open the two lane drawer **4130** at least a short distance after the two lane drawer **4130** has been unlocked for easy access to the handle. The kick-out mechanism can open the two lane drawer **4130** by 0.5", 1", 1.5", 2", 2.5", 3", 3.5", 4", at least 0.5", at least 1", at least 1.5", at least 2", at least 2.5", at least 3", at least 3.5", at least 4", or any range of two of the foregoing values. In some embodiments, the kick-out mechanism can open the two lane drawer by at least two inches. The purpose of the kick-out mechanism can be to push the two lane drawer **4130** against the latch when locked for positional repeatability. In some embodiments, the kick-out mechanism is not able to release the latch mechanism. In some embodiments, the user does not interact with the kick-out mechanism. The kick-out mechanism can allow the two lane drawer **4130** to slide relative to the analyzer **4000**.

[0057] FIGS. **6A-6C** are view of the two lane drawer **4130** in relation to the analyzer **4000** according to the present disclosure. FIG. **6A** is an example of the analyzer **4000**. The analyzer **4000** can include three of the two lane drawers **4130**. The two lane drawer **4130** can house consumables, as described herein. The analyzer **4000** can include the tip drawer **4110**. The tip drawer **4110** can house pipette tip holders **4060**, as described herein.

[0058] FIG. **6B** is a view of analyzer **4000** which includes the structural frame **4011** which is configured to support and define various decks or levels for sample processing and analysis. The analyzer **4000** can include the supplementary deck **4012**, the processing deck **4014**, and the multipurpose robot deck **4016**, as described herein. The analyzer **4000** can includes a housing or shell that surrounds the internal components, as shown in FIG. **6A**.

[0059] FIGS. **6A-6C** illustrate the analyzer **4000** including three of the two lane drawers **4130**. The two lane drawers **4130** can be adjacent. The two lane drawers **4130** can slide relative to a single

drawer plate **4140**. The drawer plate **4140** can remain stationary as the two lane drawers **4130** pull out individually relative to the plate **4140**. The two lane drawers **4130** can extend relative to the drawer plate **4140**. Each of the two lane drawers **4130** can slide relative to the drawer plate **4140**. Each of the two lane drawers **4130** can include telescoping slides to allow the two lane drawer **4130** to slide relative to the drawer plate **4140**. Each two lane drawer **4130** can slide independently of another two lane drawer **4130**. Each two lane drawer **4130** can slide sequentially with another two lane drawer **4130**. Each two lane drawer **4130** can slide simultaneously with another two lane drawer **4130**. Each two lane drawer **4130** can include a latching mechanism. Each two lane drawer **4130** can include a kick-out mechanism. Each two lane drawer **4130** can include the retention feature **4131** that extends over the corresponding pipette tip station **4134** and the extraction container station **4136**. The two lane drawers **4130** can be identical. The two lane drawers **4130** can be stacked side-by-side. The two lane drawers **4130** can include tab and slot weldments.

[0060] FIG. 7 is a view of an embodiment of a two lane drawer **4150** according to the present disclosure. The two lane drawer **4150** can include any feature of the drawers described herein. The two lane drawer **4150** can be used in combination with the extractor module **4135**. The two lane drawer **4150** can hold the same number of consumables as the two lane drawer **4130**. The two lane drawer **4150** can hold the same number of consumables as two of the drawers **4120**. The two lane drawer **4150** only has one extractor module, similar to the drawer **4130**. The two lane drawer **4150** only has one latching feature, similar to the drawer **4130**. This results in the ability to hold six lanes of consumables but with only three extractors. This results in the ability to hold six lanes of consumables but with only three latching features. The two lane drawer **4150** can reduce the number of parts. The two lane drawer **4150** can reduce costs. The two lane drawer **4150** can reduce complexity in manufacturing and servicing.

[0061] The two lane drawer **4150** is configured to house the majority of the consumables utilized in an assay workflow. The two lane drawer **4150** includes a pipette tip station **4154**, an extraction container station **4156**, and an amplification plate station **4158**. The pipette tip station **4154** is configured to hold two pipette tip holders **4060**. The extraction container station **4156** is configured to hold two extraction container holders **4020**. The amplification plate station **4158** is configured to hold two amplification plates **4040**.

[0062] The analyzer **4000** can include a stationary retention housing **4161**. In the depicted embodiment, the stationary retention housing **4161** can be a cover positioned relative to the two lane drawer **4150**. The stationary retention housing **4161** extends over the pipette tip station **4154** and the extraction container station **4156**. In this position, the stationary retention housing **4161** is configured to extend over at least a portion of the two pipette tip holders **4060** and over at least a portion of the two extraction container holders **4020** that are located in the pipette tip station **4154** and the extraction container station **4156**, respectively. The stationary retention housing **4161** can cover a perimeter of the two pipette tip holders **4060** and the two extraction container holders **4020** while allowing access thereto via openings in the stationary retention housing **4161**. The stationary retention housing **4161** functions to limit movement of the extraction container holder **4020** and the pipette tip holder **4060** during operation. In some embodiments, the stationary retention housing **4161** does not cover the amplification plates **4040** located in the amplification plate station **4158**. The stationary retention housing **4161** can be fixed relative to a drawer plate **4160**. The two lane drawer **4150** can extend relative to the drawer plate **4160**.

[0063] When consumables in drawer **4150** need to be removed and replaced with new consumables, the two lane drawer **4150** is extended while the stationary retention housing **4161** does not move relative to the two lane drawer **4150**. The two lane drawer **4150** slides relative to the stationary retention housing **4161**. The two lane drawer **4150** can include a latching feature. The two lane drawer **4150** can include a kick-out mechanism. The two lane drawer **4150** can extended along telescoping slides. The stationary retention housing **4161** can include sheet metal with tab and slot weldments.

[0064] FIG. 8 is a view of an embodiment of a three lane drawer **4170** according to the present disclosure. The three lane drawer **4170** can include any feature of the drawers described herein. The three lane drawer **4170** can be used in combination with an extractor module. The extractor module can move relative to the three lanes. In some embodiments, the extractor module can apply a magnetic field to three extraction container holders **4020**. The three lane drawer **4170** can hold the same number of consumables as three of the drawers **4120**. The three lane drawer **4170** can have only one extractor module. The three lane drawer **4170** can have only one latching feature. This results in the ability to hold six lanes of consumables but with only two extractors and two latching mechanisms. The three lane drawer **4170** can reduce the number of parts. The three lane drawer **4170** can reduce costs. The three lane drawer **4170** can reduce complexity in manufacturing and servicing.

[0065] The three lane drawer **4170** is configured to house the majority of the consumables utilized in an assay workflow. The three lane drawer **4170** includes a pipette tip station **4174**, an extraction container station **4176**, and an amplification plate station **4178**. The pipette tip station **4174** is configured to hold three pipette tip holders **4060**. The extraction container station **4176** is configured to hold three extraction container holders **4020**. The three extraction container holders **4020** can be positioned side-by-side. The amplification plate station **4178** is configured to hold three amplification plates **4040**.

[0066] The analyzer **4000** can include a stationary retention housing **4181**. The stationary retention housing **4181** can be a stationary cover positioned relative to the three lane drawer **4170**. The stationary retention housing **4181** extends over the pipette tip station **4174** and the extraction container station **4176**. In this position, the stationary retention housing **4181** is configured to extend over at least a portion of the three pipette tip holders **4060** and at least a portion of the three extraction container holders **4020** that are located in the pipette tip station **4174** and the extraction container station **4176**, respectively. The stationary retention housing **4181** can cover the perimeters of the pipette tip holders **4060** and the perimeters of the extraction container holders **4020** while allowing access thereto via openings in the stationary retention housing **4181**. The stationary retention housing **4181** functions to limit movement of the extraction container holders **4020** and the pipette tip holders **4060** during operation. In some embodiments, the stationary retention housing **4181** does not cover the amplification plates **4040** located in the amplification plate station **4178**.

[0067] When consumables in three lane drawer **4170** need to be removed and replaced with new consumables, the three lane drawer **4170** is extended while the stationary retention housing **4181** does not move relative to the three lane drawer **4170**. The three lane drawer **4170** can include a latching feature. The three lane drawer **4170** can include a kick-out mechanism. The three lane drawer **4170** can extend along telescoping slides. The stationary retention housing **4181** can include sheet metal with tab and slot weldments.

[0068] FIGS. 9A-9B are views of an embodiment of a six lane drawer **4190** according to the present disclosure. The six lane drawer **4190** can be used in combination with the tip drawer **4110**. The tip drawer **4110** can be configured to hold multiple pipette tip holders **4060**. The tip drawer **4110** can house five pipette tip holders **4060**. The six lane drawer **4190** and the tip drawer **4110** can be arranged side by side. In some embodiments, the six lane drawer **4190** and the tip drawer **4110** can be unitary. The six lane drawer **4190** and the tip drawer **4110** can move together to extend from the analyzer **4000**.

[0069] The six lane drawer **4190** can include any feature of the drawers described herein. The six lane drawer **4190** can be used in combination with an extractor module. The extractor module can move relative to six lanes. The extractor module can apply a magnetic field to one extraction container holder **4020**. The extractor module can apply a magnetic field to two or three extraction container holders **4020**. The extractor module can apply a magnetic field to six extraction container holders **4020**. The extractor module can move along an axis relative to the six lane drawer **4190**.

The extractor module can include a slide **4270**. The slide **4270** can be a rail along which the extractor module slides. The slide **4270** is described in more detail below with reference to FIG. **10A**. The six extraction container holders **4020** can be positioned side-by-side. The six lane drawer **4190** can hold the same number of consumables as six of the drawers **4120**. The six lane drawer **4190** can have only one extractor module. The six lane drawer **4190** can have only one latching feature. This results in the ability to hold six lanes of consumables but with only one extractor module and one latching mechanism. The six lane drawer **4190** can reduce the number of parts. The six lane drawer **4190** can reduce costs. The six lane drawer **4190** can reduce complexity in manufacturing and servicing.

[0070] The six lane drawer **4190** is configured to house the majority of the consumables utilized in an assay workflow. The six lane drawer **4190** includes a pipette tip station **4194**, an extraction container station **4196**, and an amplification plate station **4198**. The pipette tip station **4194** is configured to hold six pipette tip holders **4060**. The extraction container station **4196** is configured to hold six extraction container holders **4020**. The amplification plate station **4198** is configured to hold six amplification plates **4040**.

[0071] The analyzer **4000** can include a stationary retention housing **4115**. The stationary retention housing **4115** can be a single unitary structure that extends over the tip drawer **4110**, at least a portion of the pipette tip station **4191**, and at least a portion of the extraction container station **4196**. The stationary retention housing **4115** can be a stationary cover positioned relative to the tip drawer **4110**. The stationary retention housing **4115** can be a stationary cover positioned relative to the six lane drawer **4190**. The stationary retention housing **4115** can extend over the pipette tip station **4194** and the extraction container station **4196**. In this position, the stationary retention housing **4115** is configured to extend over at least a portion of the six pipette tip holders **4060** that are located in the pipette tip station **4194** of the six lane drawer **4190**. In this position, the stationary retention housing **4115** is configured to extend over at least a portion of the five pipette tip holders **4060** of the tip drawer **4110**. In this position, the stationary retention housing **4115** is configured to extend over at least a portion of the six extraction container holders **4020** that are located in the extraction container station **4196**, respectively. The stationary retention housing **4115** can be a single unitary structure that retains consumables within the tip drawer **4110** and the six lane drawer **4190**.

[0072] The stationary retention housing **4115** can cover the perimeters of the pipette tip holders **4060** and the perimeters of the extraction container holders **4020** while allowing access thereto via openings in the stationary retention housing **4115**. The stationary retention housing **4115** functions to limit movement of the extraction container holders **4020** and the pipette tip holders **4060** during operation. In some embodiments, the stationary retention housing **4115** does not cover the amplification plates **4040** located in the amplification plate station **4198**. The stationary retention housing **4115** can include a section for the tip drawer **4110**. The stationary retention housing **4115** can include sheet metal with tab and slot weldments. The stationary retention housing **4115** can include a separate top plate mounted on the outside of supports. The stationary retention housing **4115** can include supports mounted to the sides of a base **4116**. The stationary retention housing **4115** can include vertical supports to resist warping.

[0073] When consumables in the six lane drawer **4190** need to be removed and replaced with new consumables, the six lane drawer **4190** is extended while the stationary retention housing mechanism **4115** does not move relative to the six lane drawer **4190**. The six lane drawer **4190** can include a latching feature. The six lane drawer **4190** can include a kick-out mechanism. The six lane drawer **4190** can extend along telescoping slides. In some embodiments, each lane of the six lane drawer **4190** slides together. The six lane drawer **4190** can include a single drawer front. In an alternate embodiment that is not illustrated, each lane of the six lane drawer **4190** can slide individually when each lane is associated with a respective one of a plurality of drawer fronts. Each lane can include an individual sliding sub drawer. The six lane drawer **4190** can be associated with

an extractor having any of the features described herein. In some embodiments, when a run is in process on a lane, the extractor can move up and lock the lane so that the lane cannot be opened. [0074] FIGS. 10A-10C are views of an extractor module 4200 according to the present disclosure. The extractor module 4200 can be utilized with any drawer described herein. The extractor module 4200 can include a scissor lift design. The scissor lift can include a platform or plate 4202. The plate 4202 can be coupled to a plurality of magnets 4204. The magnets 4204 can apply a magnetic field to the extraction containers 4026 of the extraction container holder 4020 as described herein. The plate 4202 can include magnets 4204 configured to apply a magnetic field to extraction containers 4026 positioned in a single lane. The plate 4202 can include magnets configured to apply a magnetic field to a single extraction container holder 4020. The scissor lift can include a base 4206. The base 4206 and the plate 4202 can be structures having the same or similar shape. The base 4206 and the plate 4202 can have a mirror image configuration. The scissor lift can move in the vertical direction. The scissor lift can include scissor legs 4208. The scissor legs 4208 are the crisscross struts that bridge the gap between the base 4206 and the plate 4202. One of the scissor legs 4208 is fixed to the plate 4202 and movable relative to the base 4206. The other scissor leg 4208 is fixed to the base 4206 and movable relative to the plate 4202. The scissor lift moves upward by extending the scissor legs 4208 from a generally horizontal orientation toward a generally vertical orientation. The scissor lift moves downward by extending the scissor legs 4208 from a generally vertical orientation toward a generally horizontal orientation. The extractor module 4200 can include the slide 4270. The slide 4270 can allow the extractor module 4200 to move relative to the corresponding drawer. The extractor module 4200 can include a linear drive 4272. The linear drive 4272 can move the extractor module 4200 relative to the slide 4270. [0075] FIG. 10B illustrates the extractor module 4200 relative to the two lane drawer 4130. FIG. 10B shows three of the two lane drawers 4130. The extractor module 4200 can be used with any of the drawers described herein. The extractor module 4200 can be used with a three lane drawer 4170. The extractor module 4200 can be used with a six lane drawer 4190. The two lane drawers 4130 can include the extraction container station 4136. The extraction container station 4136 can hold two extraction container holders 4020. The extraction container holders 4020 can be side-by-side. The extractor module 4200 can be in a first position to apply a magnetic field to a first extraction container holder 4020 of the first two lane drawer 4130, as shown in FIG. 10B. The extractor module 4200 can move up and down relative to the first extraction container holder 4020 in the first position. The extractor module 4200 can apply a magnetic field to a single extraction container holder 4020 in the extraction container station 4136 of the first two lane drawer 4130. The extractor module 4200 can move from the first position to a second position. The extractor module 4200 can be in the second position to apply a magnetic field to a second extraction container holder 4020 of the first two lane drawer 4130. The extractor module 4200 can move along the slide 4270 to the second extraction container holder 4020. The extractor module 4200 can move up and down relative to the second extraction container holder 4020 in the second position. [0076] The extractor module 4200 can move along the slide 4270 to the second two lane drawer 4130. The extractor module 4200 can move from the second position to a third position. The extractor module 4200 can be in the third position to apply a magnetic field to a third extraction container holder 4020 of the second two lane drawer 4130. The extractor module 4200 can move along the slide 4270 to the third extraction container holder 4020. The extractor module 4200 can move up and down relative to the third extraction container holder 4020 in the third position. The extractor module 4200 can move from the third position to a fourth position. The extractor module 4200 can be in the fourth position to apply a magnetic field to a fourth extraction container holder 4020 of the second two lane drawer 4130. The extractor module 4200 can move along the slide 4270 to the fourth extraction container holder 4020. The extractor module 4200 can move up and down relative to the fourth extraction container holder 4020 in the fourth position. [0077] The extractor module 4200 can move along the slide 4270 to the third two lane drawer

4130. The extractor module **4200** can move from the fourth position to a fifth position. The extractor module **4200** can be in the fifth position to apply a magnetic field to a fifth extraction container holder **4020** of the third two lane drawer **4130**. The extractor module **4200** can move along the slide **4270** to the fifth extraction container holder **4020**. The extractor module **4200** can move up and down relative to the fifth extraction container holder **4020** in the fifth position. The extractor module **4200** can move from the fifth position to a sixth position. The extractor module **4200** can be in the sixth position to apply a magnetic field to a sixth extraction container holder **4020** of the third two lane drawer **4130**. The extractor module **4200** can move along the slide **4270** to the sixth extraction container holder **4020**. The extractor module **4200** can move up and down relative to the sixth extraction container holder **4020** in the sixth position. The extractor module **4200** can move from the sixth position back to the first position, and between any two of the first, second, third, fourth, fifth, or sixth positions. While the extractor module **4200** is shown in relation to the three of the two lane drawers **4130**, the extractor module **4200** can be utilized with any drawer described herein.

[0078] FIG. **10A** shows the extractor module **4200** in an extended or up configuration. FIG. **10C** shows the extractor module **4200** in a collapsed or down configuration. The extractor module **4200** can move up and down to change the position of the magnetic field relative to the extraction containers **4026** of the extraction container holder **4020**. The assembly can include three of the two lane drawers **4130**. The two lane drawers **4130** can be positioned side-by-side. In some embodiments, each two lane drawers **4130** can include the extractor module **4200**. The assembly can include three extractor modules **4200**. The extractor module **4200** can move between lanes of the two lane drawers **4130**. In some embodiments, the assembly can include one extractor module **4200**. The extractor module **4200** can move between all of the two lane drawers **4130**. The extractor module **4200** can move between three of the two lane drawers **4130**. The extractor module **4200** can move between all six lanes. In some methods of use, the extractor module **4200** can be collapsed relative to the first two lane drawer **4130** after applying magnetic field to the extraction container holders **4020** in a first two lane drawer **4130**. Then the extractor module **4200** can move to a second two lane drawer **4130**, then extend to apply a magnetic field to the extraction container holders **4020** in the second two lane drawer **4130**, and then collapsed relative to the second two lane drawer **4130**. Then the extractor module **4200** can move to a third two lane drawer **4130**, then extend to apply a magnetic field to the extraction container holders **4020** in the third two lane drawer **4130**, and then collapsed relative to the third two lane drawer **4130**. The extractor module **4200** can move to any two lane drawer **4130** in any order.

[0079] FIG. **11** is a view of an extractor module **4300** according to the present disclosure. The extractor module **4300** can be utilized with any drawer described herein. The extractor module **4300** can include a pusher design. The pusher can include a platform or plate **4302**. The plate **4302** can be coupled to a plurality of magnets **4304**. The plate **4302** can include magnets **4304**. The magnets **4304** apply a magnetic field to extraction containers **4020**. The magnets **4304** can be arranged to apply a magnetic field to two lanes. The magnets **4304** can be arranged to apply a magnetic field two extraction container holders **4020**. In some embodiments, the plate **4302** with the magnets **4304** can stay in the two lane drawer **4130** at all times. In some embodiments, there can be one plate **4302** with the magnets **4304** in each two lane drawer **4130**. The extractor module **4300** can include a pusher arm **4308**. The pusher arm **4308** can rotate counterclockwise as viewed in FIG. **11** to move the plate **4302** upward and rotate clockwise as viewed in FIG. **11** to move the plate **4302** downward. The drawer **4130** can include a plate **4310** having a slot **4312** through which the pusher arm **4308** rotates. The extractor module **4300** can include a slide **4370**. The slide **4370** can allow the extractor module **4300** to move relative to the corresponding drawer. The extractor module **4300** can include a linear drive **4372**. The linear drive **4372** can move the extractor module **4300** relative to the slide **4370**. In some embodiments, the magnets **4304** are not directly attached to the linear drive **4372** or the pusher arm **4308**.

[0080] FIG. 11 illustrates the extractor module **4300** relative to the two lane drawer **4130**. The two lane drawer **4130** includes the pipette tip station **4134**, the extraction container station **4136**, and the amplification plate station **4138**. The pipette tip station **4134** is configured to hold two pipette tip holders **4060**. The extraction container station **4136** is configured to hold two extraction container holders **4020**. The amplification plate station **4138** is configured to hold two amplification plates **4040**. The extraction containers **4020** can be side-by-side. The extractor module **4300** can be in an up position to apply a magnetic field to a first extraction container holder **4020** and a second extraction container holder **4020**. The extractor module **4300** can move up and down relative to the extraction container holders **4020**. The extractor module **4300** can apply a magnetic field to two extraction container holders **4020** in the extraction container station **4136**. [0081] Referring back to FIG. 6C, the assembly can include three of the two lane drawers **4130**. The two lane drawers **4130** can be positioned side-by-side. The extractor module **4300** can be collapsed relative to the first two lane drawer **4130**. The extractor module **4300** can move to a second two lane drawer **4130**. The extractor module **4300** can move along the slide **4370** to the second two lane drawer **4130**. The extractor module **4200** can be in a second position to apply a magnetic field to the extraction container holders **4020** of the second two lane drawer **4130**. The extractor module **4300** can move up and down relative to the second two lane drawer **4130** in the second position. The extractor module **4300** can be collapsed relative to the second two lane drawer **4130**. The extractor module **4300** can move to a third two lane drawer **4130**. The extractor module **4300** can move along the slide **4370** to the third two lane drawer **4130**. The extractor module **4200** can be in a third position to apply a magnetic field to the extraction container holders **4020** of the third two lane drawer **4130**. The extractor module **4300** can move up and down relative to the third two lane drawer **4130** in the third position. While the extractor module **4300** is shown in relation to the two lane drawer **4130**, the extractor module **4300** can be utilized with any drawer described herein. The extractor module **4300** can move between drawers. The extractor module **4300** can reduce the total number of extractor modules needed in a multi-drawer assembly of the analyzer **4000**. The extractor module **4300** can reduce costs. The extractor module **4300** can reduce complexity in manufacturing and complexity. This can allow one extractor module **4300** to reside in the analyzer **4000**.

[0082] In some embodiments, a two lane drawer assembly is provided. The two lane drawer assembly can include a two lane drawer. The two lane drawer can include a pipette tip station configured to house two pipette tip holders. The two lane drawer can include an extraction container station configured to house two extraction container holders. The two lane drawer can include an amplification plate station configured to house two amplification plates. The two lane drawer assembly can include an extractor module positioned relative to the extraction container station. In some embodiments, the extractor module comprises magnets configured to apply a magnetic field to extraction container holders of the two extraction container holders.

[0083] In some embodiments, the extractor module is configured to process samples from the one extraction container holder. In some embodiments, the extractor module is configured to move up and down relative to the two extraction container holders. In some embodiments, the extractor module is configured to move up and down along one or more rails. In some embodiments, the two lane drawer comprises a retention feature configured to extend over a portion of the pipette tip station and the extraction container station. In some embodiments, the two lane drawer comprises a latching mechanism comprising a push-to-close latch. In some embodiments, the two lane drawer comprises a kick-out mechanism configured to facilitate the sliding extension of the two lane drawer. In some embodiments, the two lane drawer comprises telescoping slides. In some embodiments, the two lane drawer assembly can include the two pipette tip holders, the two extraction container holders, and the two amplification plates. In some embodiments, the two lane drawer assembly can include three of the two lane drawers. In some embodiments, the two lane drawer assembly can include a tip drawer configured to house five pipette tip holders.

[0084] The foregoing description is intended to illustrate various aspects of the present technology. It is not intended that the examples presented herein limit the scope of the present technology. The technology now being fully described, it will be apparent to one of ordinary skill in the art that many changes and modifications can be made thereto without departing from the spirit or scope of the appended claims.

Claims

1. A two lane drawer assembly comprising: a two lane drawer comprising: a pipette tip station configured to house two pipette tip holders; an extraction container station configured to house two extraction container holders; and an amplification plate station configured to house two amplification plates; an extractor module positioned relative to the extraction container station, wherein the extractor module comprises magnets configured to apply a magnetic field to extraction container holders of the two extraction container holders.
 2. The two lane drawer assembly of claim 1, wherein the extractor module is configured to process samples from the one extraction container holder.
 3. The two lane drawer assembly of claim 1, wherein the extractor module is configured to move up and down relative to the two extraction container holders.
 4. The two lane drawer assembly of claim 1, wherein the extractor module is configured to move up and down along one or more rails.
 5. The two lane drawer assembly of claim 1, wherein the two lane drawer comprises a retention feature configured to extend over a portion of the pipette tip station and the extraction container station.
 6. The two lane drawer assembly of claim 1, wherein the two lane drawer comprises a latching mechanism comprising a push-to-close latch.
 7. The two lane drawer assembly of claim 1, wherein the two lane drawer comprises a kick-out mechanism configured to facilitate the sliding extension of the two lane drawer.
 8. The two lane drawer assembly of claim 1, wherein the two lane drawer comprises telescoping slides.
 9. The two lane drawer assembly of claim 1, further comprising the two pipette tip holders, the two extraction container holders, and the two amplification plates.
 10. The two lane drawer assembly of claim 1, further comprising three of the two lane drawers.
 11. The two lane drawer assembly of claim 1, further comprising a tip drawer configured to house five pipette tip holders.
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