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Patent

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Coke Moya Smead

ACTING DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

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If this application was filed prior to June 8, 1995, the term of this patent begins on the date on which this patent issues and ends on the later of seventeen years from the date of the grant of this patent or the twenty-year term set forth above for patents resulting from applications filed on or after June 8, 1995, subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b) and any extension as provided by 35 U.S.C. 156 or any disclaimer under 35 U.S.C. 253.



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Siddiqui

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(54) **SYSTEMS AND METHODS FOR
AUTONOMOUS INVENTORY COUNTING
AND TRACKING**

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patent is extended or adjusted under 35
U.S.C. 154(b) by 77 days.

This patent is subject to a terminal dis-
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G07F 11/04 (2006.01)

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CPC **G06Q 10/087** (2013.01); **G07F 11/045**
(2013.01)

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1/087; A47F 1/12; A47F 1/06; A47F
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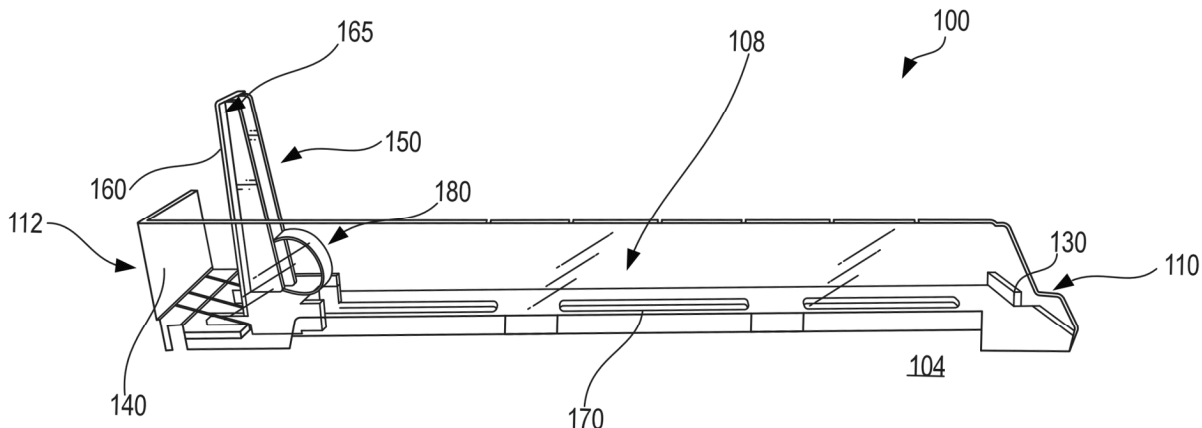
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(57) **ABSTRACT**

A method of tracking inventory comprises providing a
dispenser. The dispenser includes a body laterally extending
between a first end and a second end. The dispenser also
includes a stopper slidably coupled to the body to move
between the first end and the second end and a biasing
member coupled to the stopper to bias the stopper towards
the second end. A plurality of identifiers are displayed on the
biasing member. The method includes securing a plurality of
units within the dispenser between the stopper and the
second end, and displaying at least one of the plurality of
identifiers to a user of the dispenser, the at least one of the
plurality of identifiers corresponding to a total number of
units in the dispenser.

19 Claims, 13 Drawing Sheets



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5/0861; A47F 13/085; A47F 1/10-1/128

See application file for complete search history.

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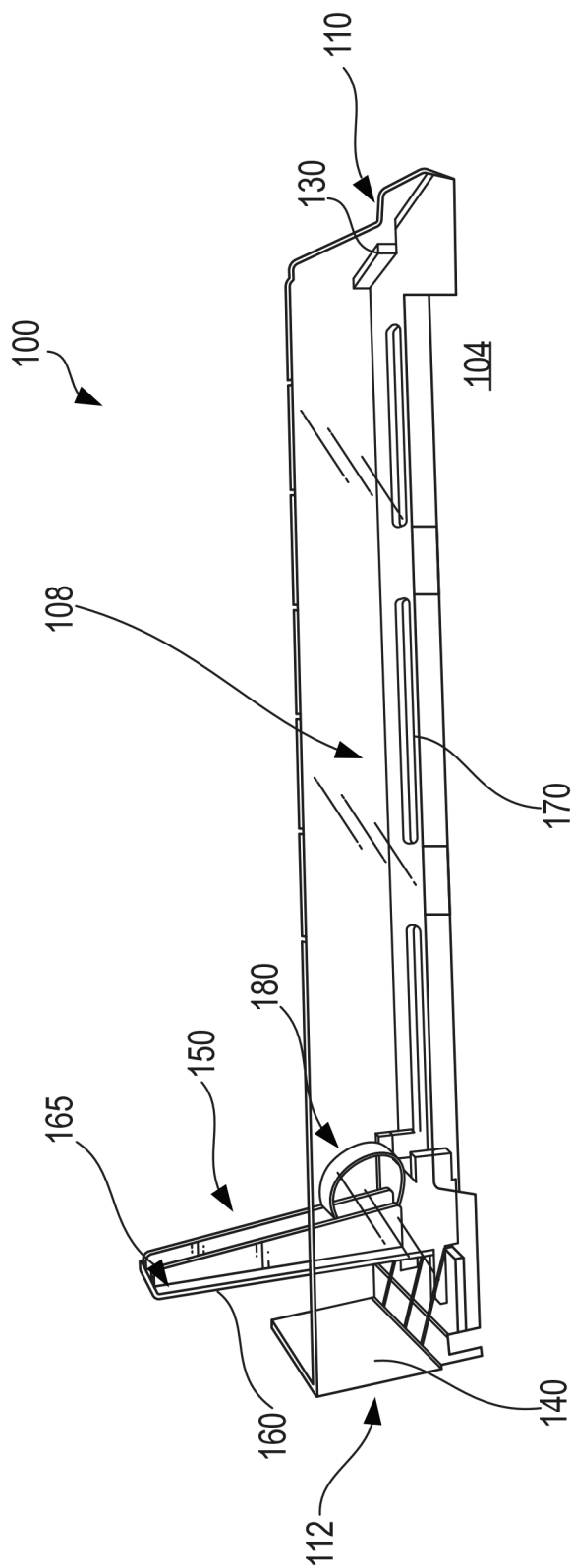


FIG. 1

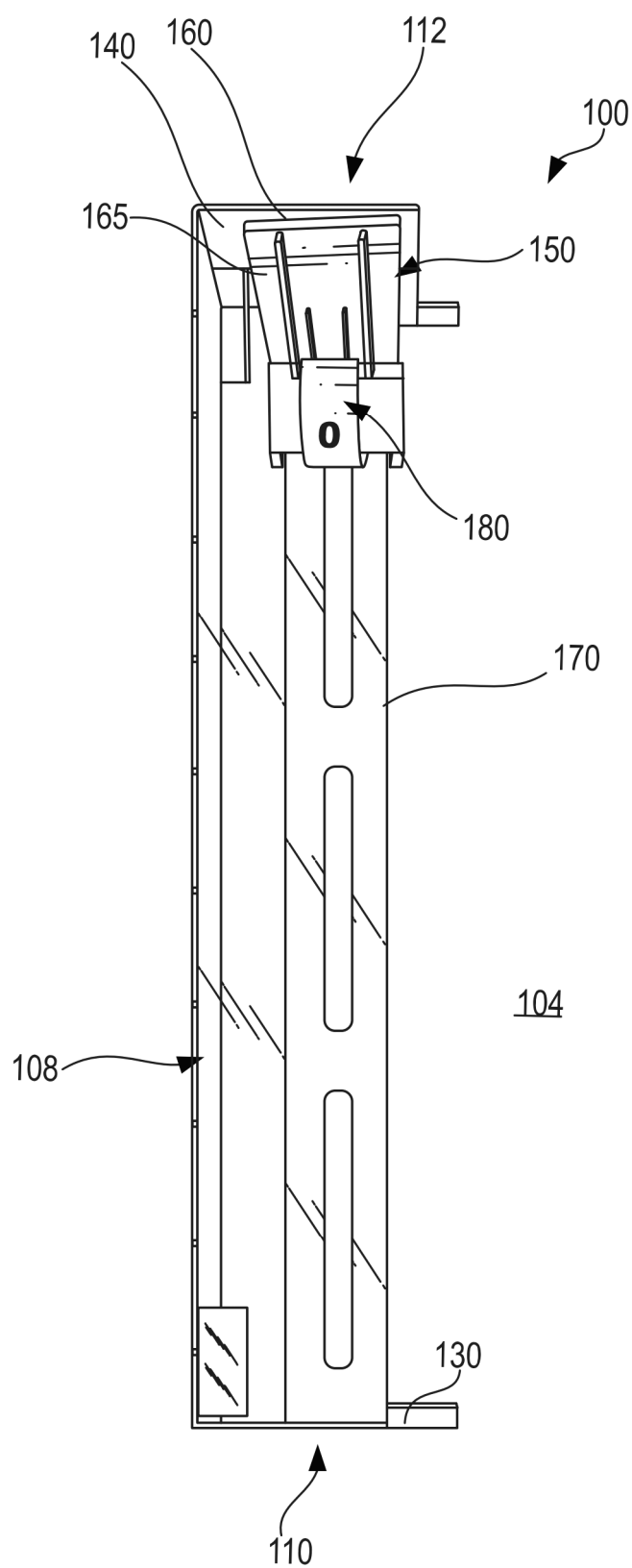


FIG. 2

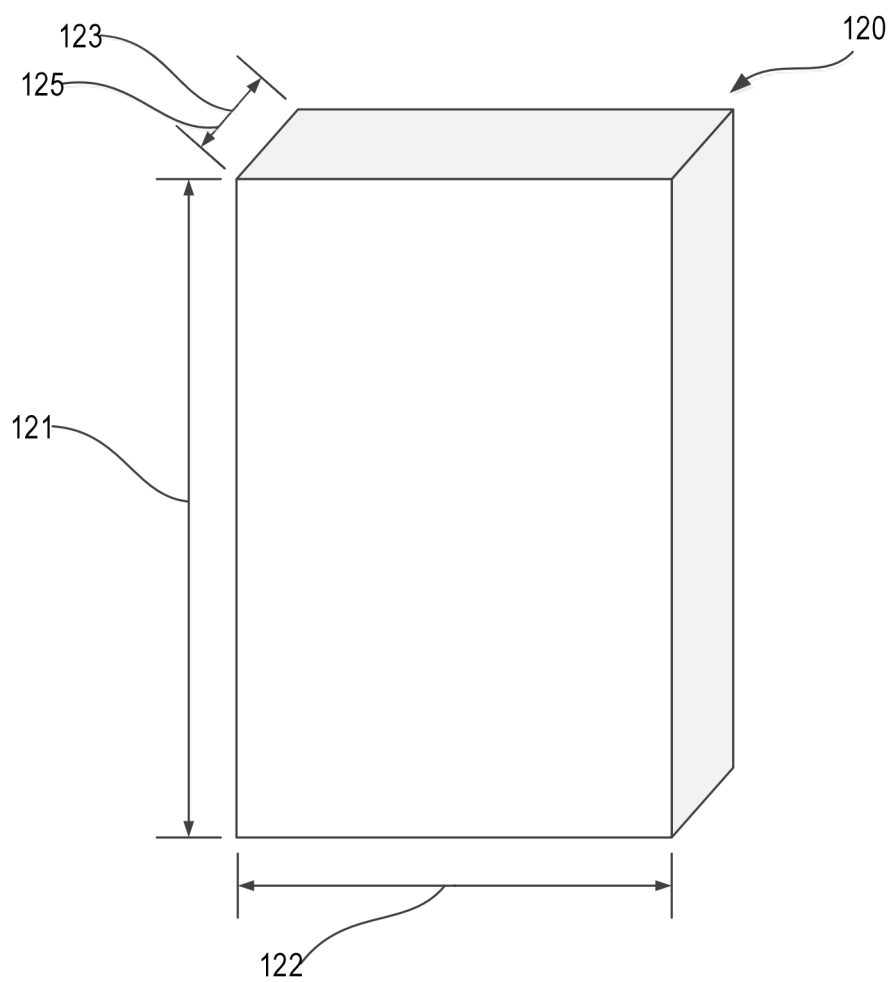


FIG. 3

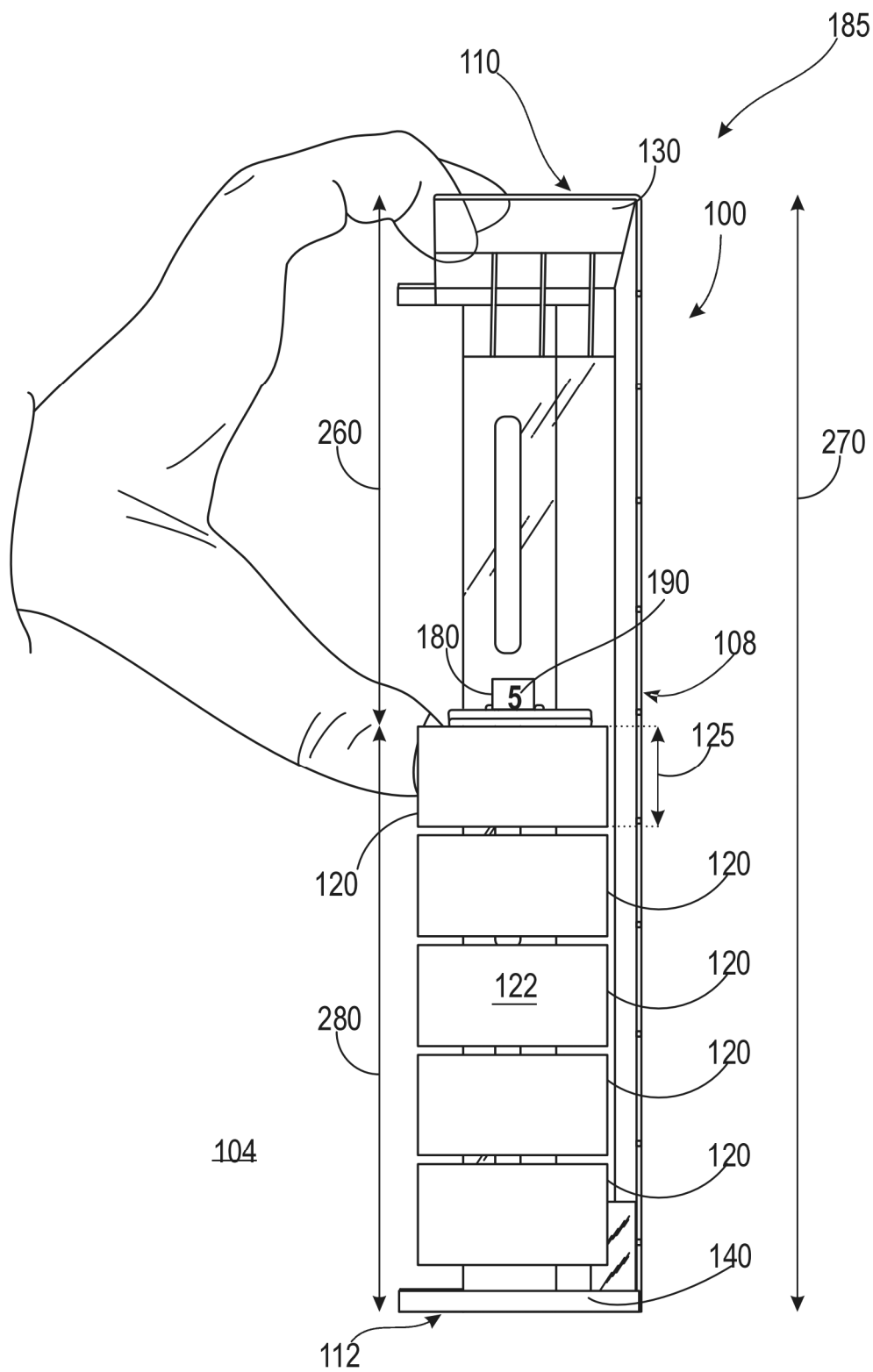


FIG. 4

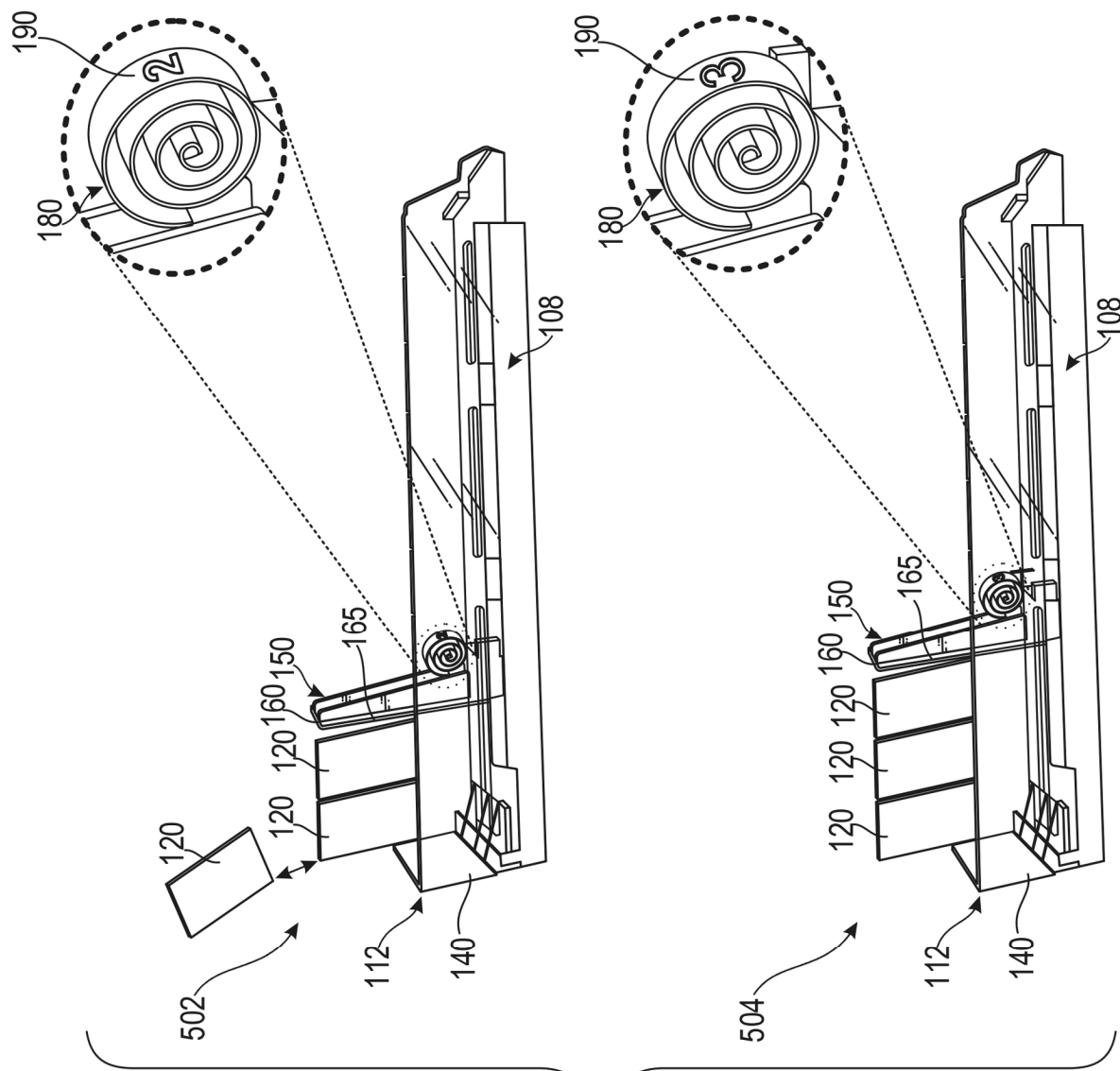


FIG. 5A

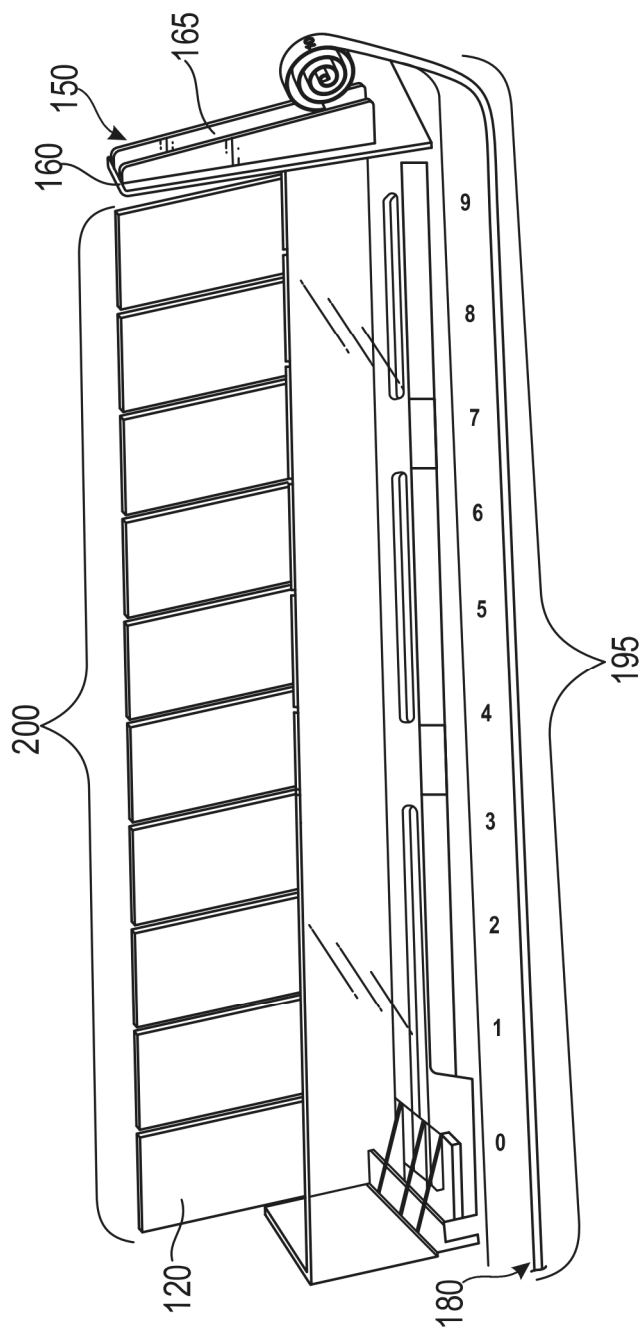


FIG. 5B

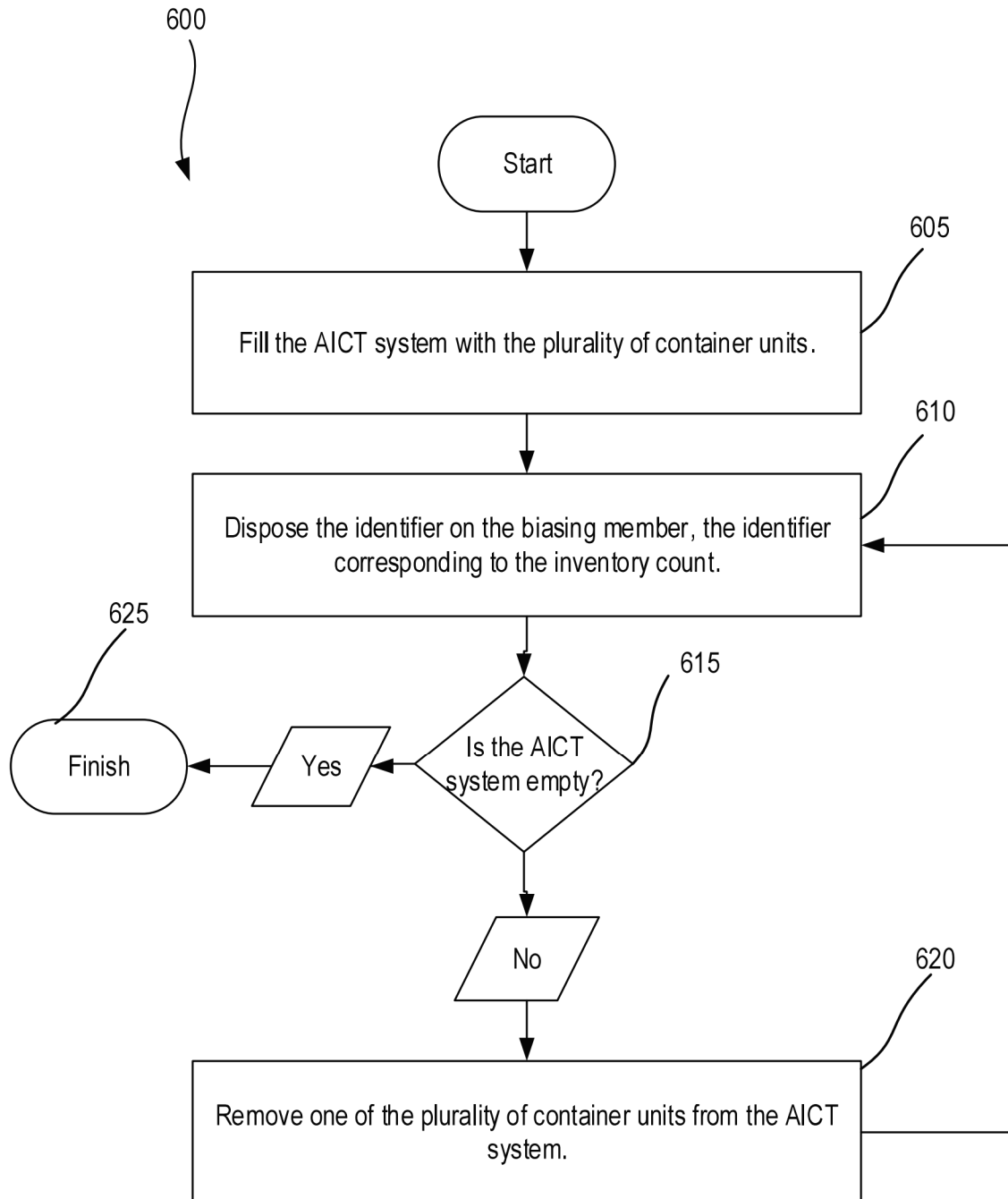


FIG. 6

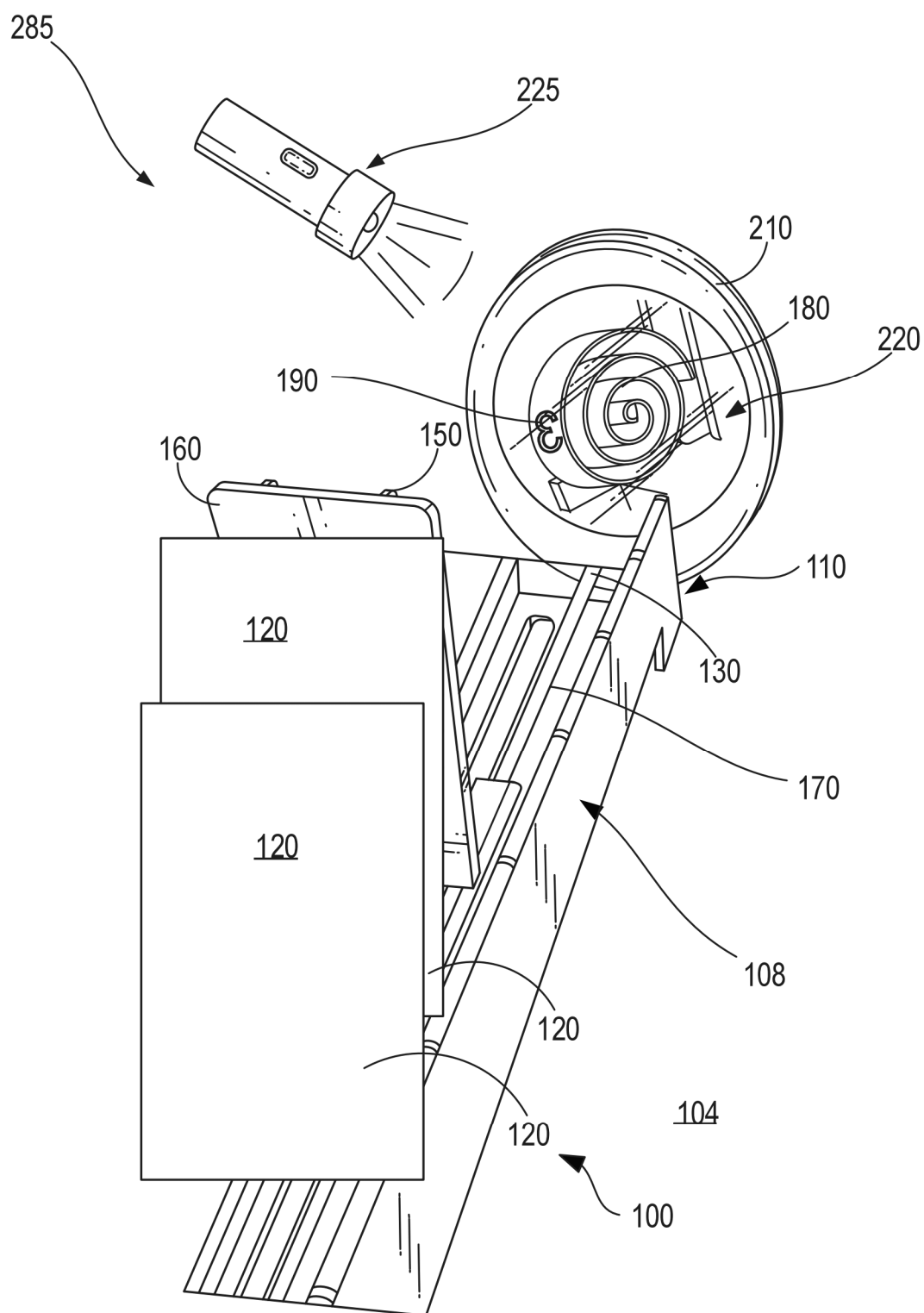


FIG. 7

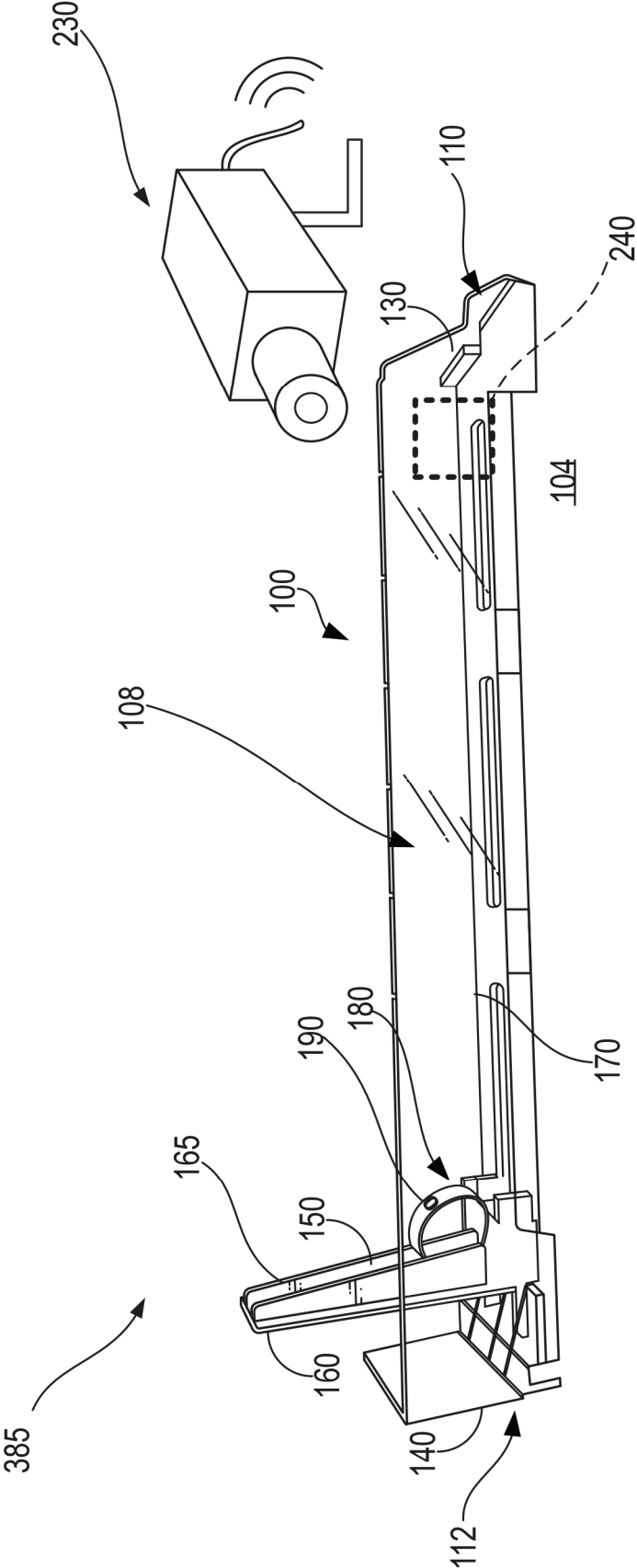


FIG. 8

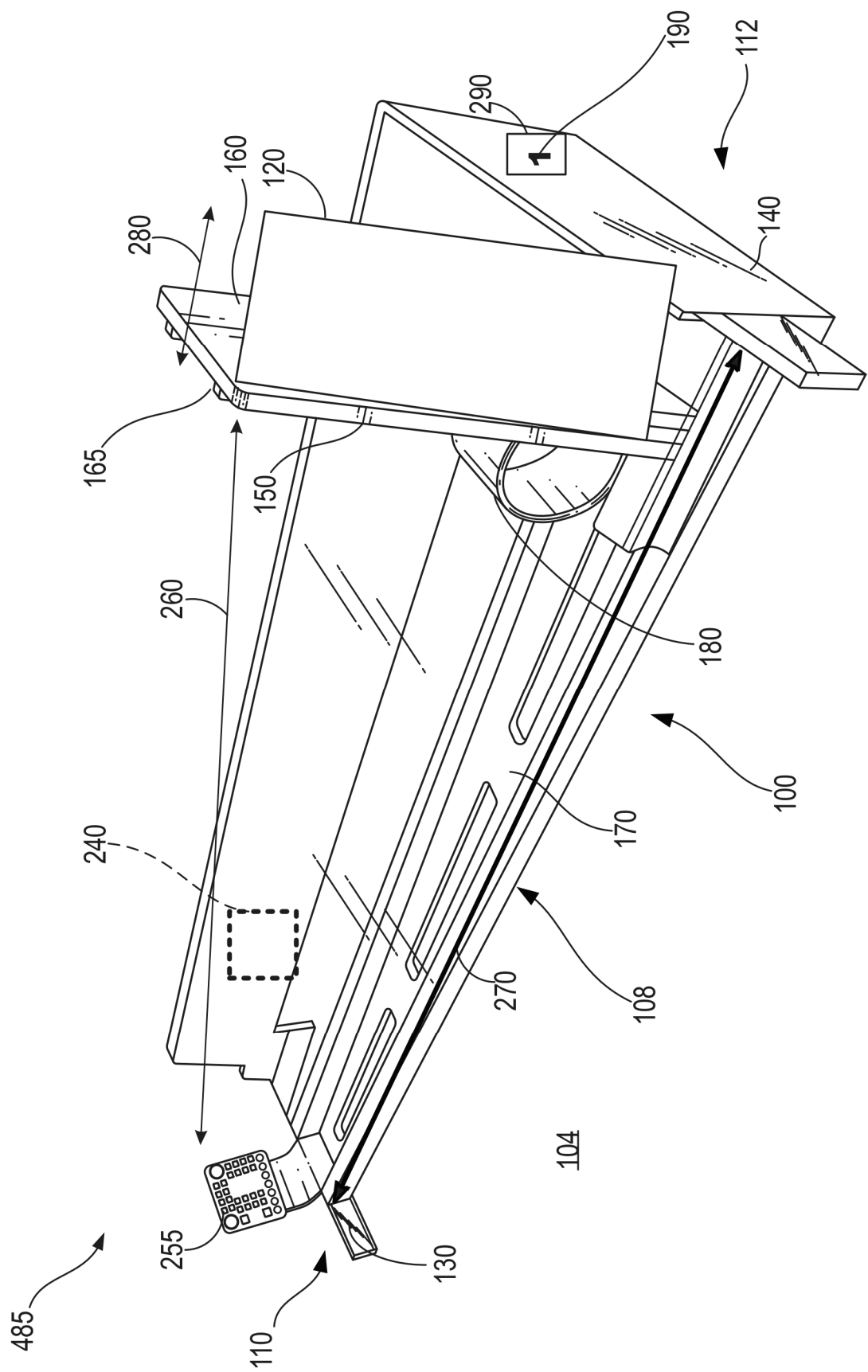


FIG. 9

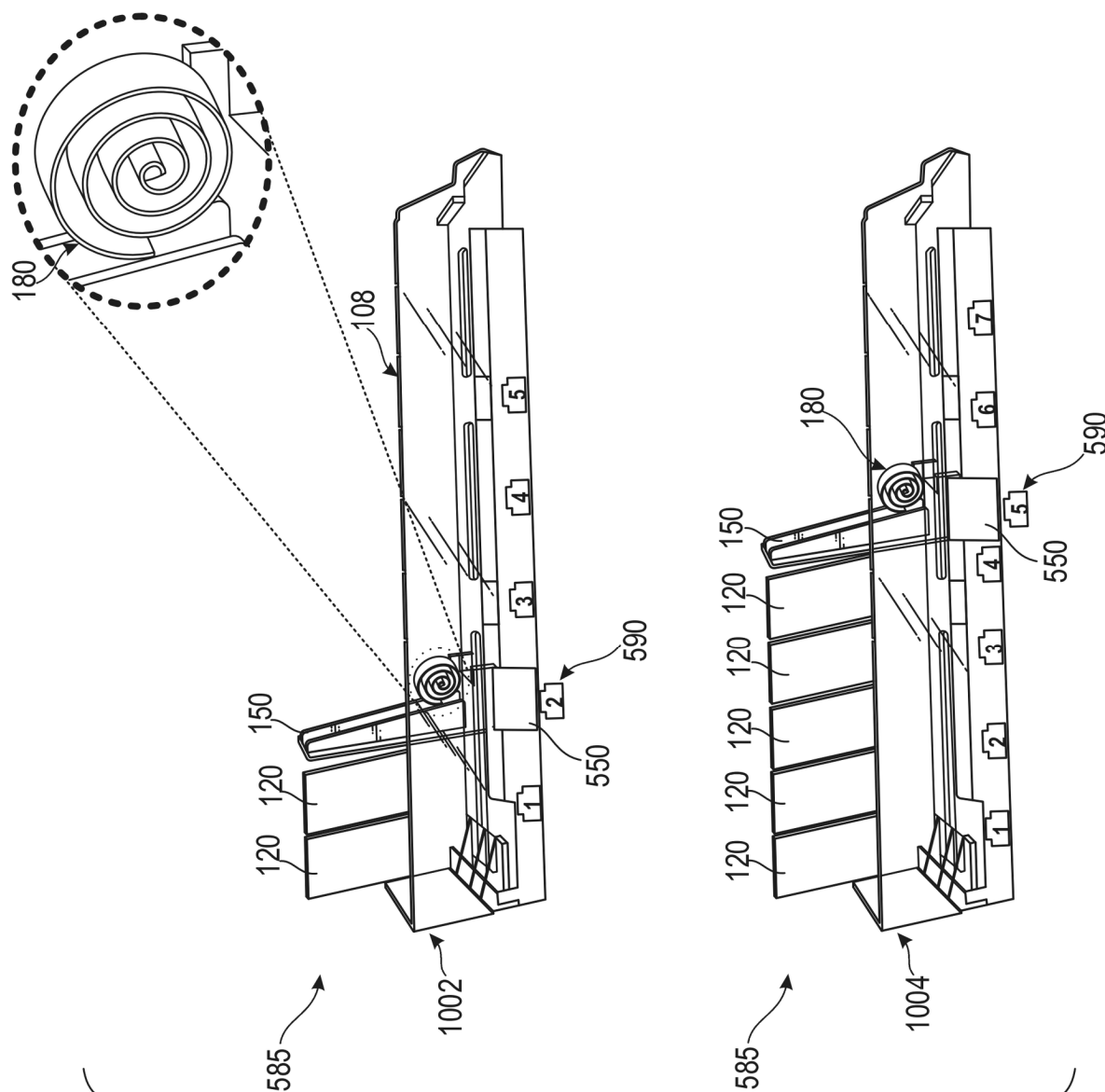


FIG. 10

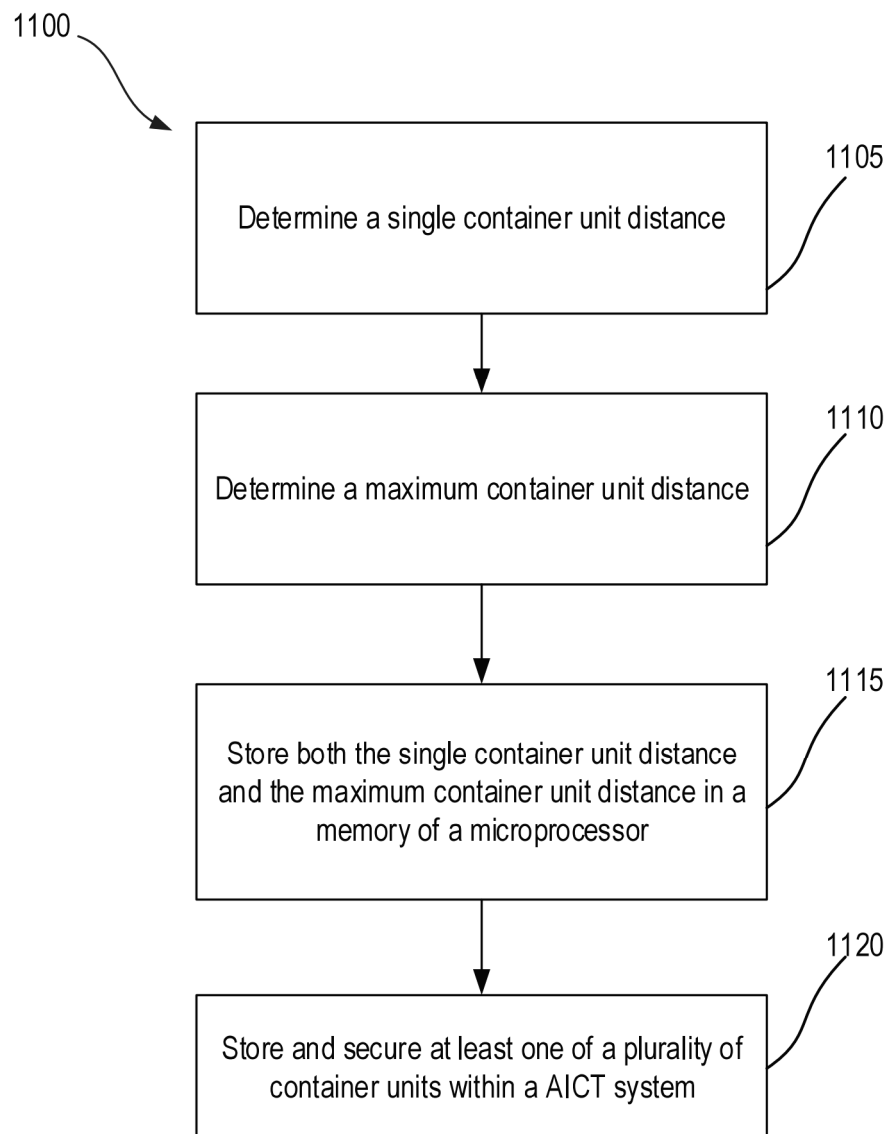


FIG. 11

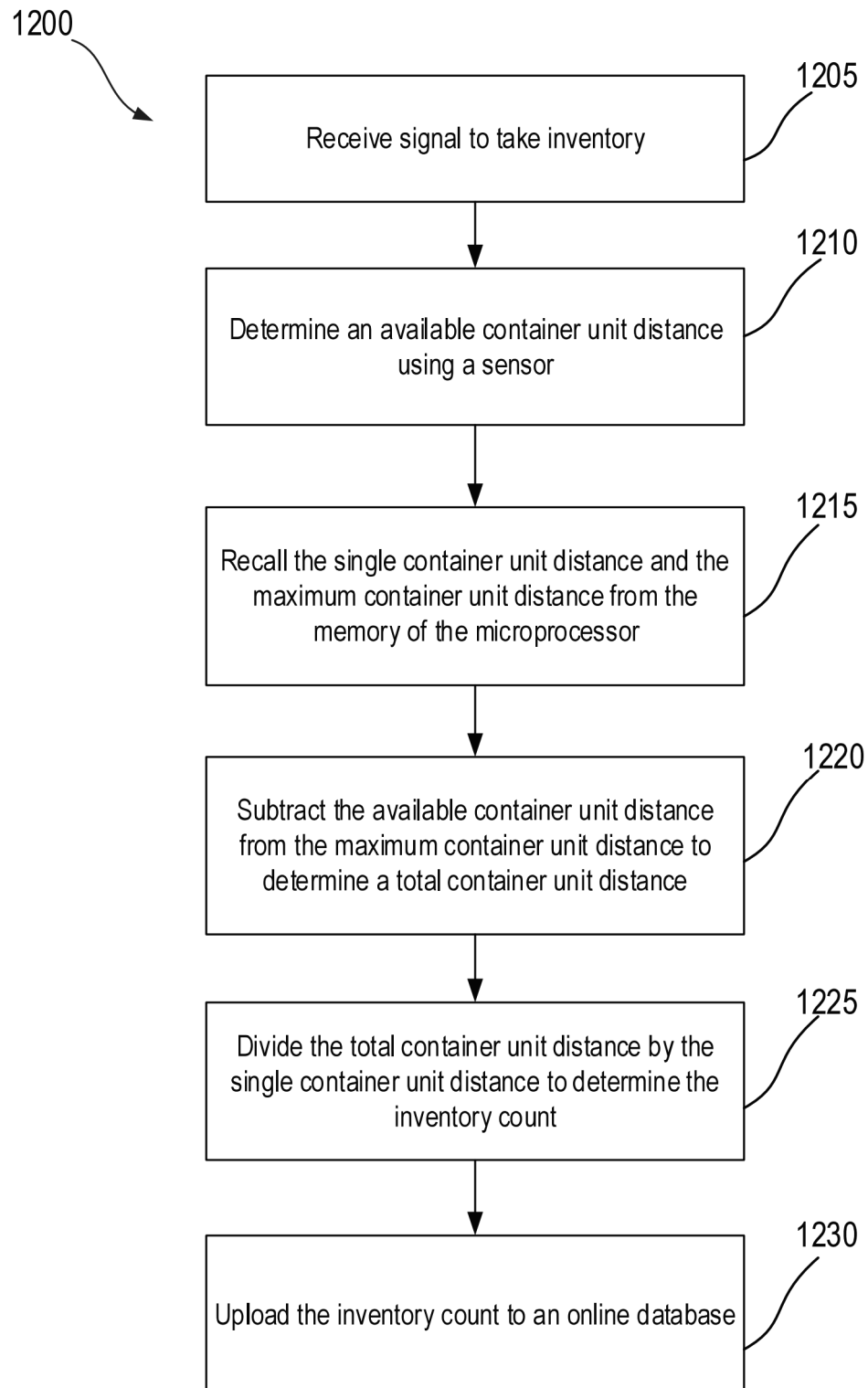


FIG. 12

1

SYSTEMS AND METHODS FOR AUTONOMOUS INVENTORY COUNTING AND TRACKING

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 16/355,432, filed Mar. 15, 2019, the entire disclosure of which is incorporated by reference herein.

TECHNICAL FIELD

The present application relates generally to the field of taking inventory of consumer goods. More specifically, the present application relates to systems and methods for counting and taking inventory autonomously.

BACKGROUND

Convenience store shelves must be adequately and timely stocked to ensure sales opportunities are not missed. Adequately and timely stocking the store shelves can be challenging for retailers if they are unsure about their inventory or if their inventory cannot keep up with demand. Products in high consumer demand can be difficult to keep adequately and timely stocked because these products can sell out quickly. Additionally, products with seasonal demand fluctuations can be difficult to adequately and timely stock because inventory needs to adjust to the demand to prevent selling out during high demand times or overstocking during low demand times. Moreover, even adequately and timely stocking store shelves can be challenging because inventory is traditionally taken by hand. Taking inventory by hand is not always reliable, and smaller retailers (e.g., gas stations, drug stores, etc.) may have too few employees, too much variety in products, and/or budget restrictions that prevent them from adopting the traditional Kanban practices utilized by larger manufacturing firms. But keeping shelves stocked in a timely manner can maximize revenue for these smaller retailers and satisfy their customers' expectations.

SUMMARY

Various example embodiments relate to a method of tracking inventory. The method of tracking inventory includes storing at least one container unit within an autonomous inventory counting and tracking (AICT) system. The AICT system includes a dispenser. The dispenser includes a body, a first ledge, defining a first end of the body, a second ledge defining a second end of the body, the second ledge spaced laterally away from the first ledge, and a track. The track is positioned between the first ledge and the second ledge. A container unit is secured within the AICT system using a stopper. The stopper includes a first face configured to interface with the container unit and the stopper includes a second face opposite the first face, wherein the stopper moves translationally toward the first ledge in response to the container unit being added to the dispenser, and wherein the stopper moves translationally toward the second ledge in response to the container unit being removed from the dispenser. A single container unit distance is identified, wherein the single container unit distance is a change in distance between the first face and the second ledge when a single container unit is removed from the dispenser. A total container unit distance is identified, wherein the total con-

2

tainer unit distance is the distance between the first face and the second ledge. An inventory count is determined using the total container unit distance and the single container unit distance, the inventory count representative of the container units in the AICT system. The inventory count is displayed to a person taking inventory.

In an alternative embodiment, the inventory counting and tracking system comprises a dispenser configured to store at least one container unit, wherein the dispenser has a first ledge and a second ledge positioned on opposite ends of the dispenser. An arm is coupled to the dispenser, such that the arm moves towards the first ledge in response to a container unit being added to the dispenser, and wherein the arm moves towards the second ledge in response to a container unit being removed from the dispenser. A single container unit distance is defined by the distance that the arm moves when a single container unit is added to the dispenser. A biasing mechanism is operably coupled to the arm and biases the arm towards the second ledge. A sensor is coupled to the arm such that the sensor is configured to determine the distance between the second ledge and the arm. A processor is configured to determine the number of container units in the dispenser using the total container unit distance and the single container unit distance, and a display device operably coupled to the processor, wherein the display device is configured to notify a user the number of container units in the dispenser.

In an alternative embodiment, the inventory counting and tracking system comprises a dispenser configured to store at least one container unit, wherein the dispenser has a first ledge and a second ledge positioned on opposite ends of the dispenser. An arm is coupled to the dispenser, such that the arm moves towards the first ledge in response to a container unit being added to the dispenser, and wherein the arm moves towards the second ledge in response to a container unit being removed from the dispenser. A single container unit distance is defined by the distance that the arm moves when a single container unit is added to the dispenser. A biasing mechanism is operably coupled to the arm and biases the arm towards the second ledge. A sensor is coupled to the first ledge such that the sensor is configured to determine the distance between the arm and the first ledge. A processor is configured to determine the number of container units in the dispenser using the total container unit distance and the single container unit distance, and a display device operably coupled to the processor, wherein the display device is configured to notify a user the number of container units in the dispenser.

In another embodiment, an autonomous inventory counting and tracking system is described. The system includes a dispenser configured to accept a container unit. The dispenser includes a body, a first ledge defining a first end of the body, a second ledge defining a second end of the body, the second ledge spaced laterally away from the first ledge, a track positioned between the first ledge and the second ledge and extending the length of the body, and a stopper slidably coupled to the track. The stopper includes a first face and the stopper comprising a second face opposite the first face. The stopper is configured to move translationally toward the first ledge in response to the container unit being added to the dispenser. The stopper is configured to move toward the second ledge in response to the container unit being removed from the dispenser. A single container unit distance is defined by the distance that the stopper moves when the container unit is added to the dispenser. A biasing member is operably coupled to the stopper that biases the stopper toward the second ledge, the biasing member comprising. A

3

rolled coil of metal includes a first coil end coupled to the second ledge and a second coil end coupled to the stopper. An identifier is coupled to the rolled coil of metal, the identifier corresponding to the inventory count. A distance sensor is coupled to a second face of the stopper. The distance sensor is configured to measure the distance between the second ledge and the second face. A controller is configured to determine an inventory count using a total container unit distance and the single container unit distance. A display is configured to display the inventory count. The controller is configured to control the distance sensor and control the display and the inventory count corresponds to the container units remaining in the AICT system.

In yet another embodiment, an inventory counting and tracking (AICT) system is described. A dispenser is configured to accept a container unit. The dispenser includes a body, a first ledge defining a first end of the body, a second ledge defining a second end of the body, the second ledge spaced laterally away from the first ledge, a track, the track positioned between the first ledge and the second ledge and extending the length of the body, and a stopper slidably coupled to the track. The stopper is configured to move translationally toward the first ledge in response to the container unit being added to the dispenser. The stopper is configured to move toward the second ledge in response to the container unit being removed from the dispenser. A single container unit distance is defined by the distance that the stopper moves when the container unit is added to the dispenser. A biasing member is operably coupled to the stopper that biases the stopper toward the second ledge. An identifier is visible to a person taking inventory and corresponding to the container units in the AICT system.

These and other features, together with the organization and manner of operation thereof, will become apparent from the following detailed description when taken in conjunction with the accompanying drawings, wherein like elements have like numerals throughout the several drawings described below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side view of a dispenser, according to an example embodiment.

FIG. 2 shows a top view of the dispenser of FIG. 1.

FIG. 3 shows a perspective view of a container unit.

FIG. 4 shows a top view of an autonomous inventory counting and tracking system, according to an exemplary embodiment.

FIG. 5A shows multiple side view of a portion of the autonomous inventory counting and tracking system of FIG. 4.

FIG. 5B shows a side view of a portion of the autonomous inventory counting and tracking system of FIG. 4.

FIG. 6 shows a method of configuring the autonomous inventory counting and tracking system of FIG. 4.

FIG. 7 shows a perspective view of an autonomous inventory counting and tracking system, according to another exemplary embodiment.

FIG. 8 shows a perspective view of an autonomous inventory counting and tracking system, according to yet another exemplary embodiment.

FIG. 9 shows a perspective view of an autonomous inventory counting and tracking system, according to an even further exemplary embodiment.

4

FIG. 10 shows a pair of perspective view of an autonomous inventory counting and tracking system in different positions, according to an even further exemplary embodiment.

FIG. 11 shows a method for configuring the autonomous inventory counting and tracking system, according to an exemplary embodiment.

FIG. 12 shows a method for autonomously counting and tracking inventory using the autonomous inventory counting and tracking system, according to an exemplary embodiment.

DETAILED DESCRIPTION

In order to track inventory, many consumer items in a convenience store are counted by hand and recorded in some sort of hand-written log. For example, convenience store employees are usually instructed to count all packs of cigarettes for each brand of cigarette at least once during each shift. In large convenience stores, this means convenience store employees may have to count over three-thousand packs of cigarettes each time inventory is taken. Cigarettes are typically stored in rows in individual cigarette dispensers behind the check-out counter. To speed up the process of taking inventory, employees number the top of each box in a row so that cigarettes can be counted in rows instead of being counted by the individual box. However, labeling each pack of cigarettes can be time consuming and unreliable. Over time, the packs may become disorganized and out of numerical order, possibly leading to inventory tracking errors. For this reason, there is a market need for a product that can increase the efficiency and accuracy of inventory tracking.

In addition to reducing inventory tracking errors, it is important to monitor the products to determine if they are being stolen. A potential problem in convenience stores is the theft of items from both the product shelves and from behind the counter. Without actively tracking inventory, it can be difficult to determine what products (if any) were stolen and when it was stolen. Currently, monitoring theft would require someone to review the entire shift of an employee when a product discrepancy occurs. Reviewing security camera footage is a time consuming process and may require hours of reviewing footage to determine if and when a single item was stolen. Convenience store owners may attempt to minimize the number of cigarette packs that employees steal by instructing the employees to regularly take inventory of the cigarettes. However, when taking inventory, employees can steal cigarettes and then intentionally record an incorrect number of cigarettes in their inventory log to give the appearance that no cigarettes were stolen during the employees' work shift. For this reason, there is a market need for a device that automatically, continuously, and actively tracks cigarette inventory and other products.

Referring to the figures generally, a system for and a method of tracking inventory is described. The method includes storing a plurality of container units (e.g., cigarette packs, product container, etc.) in an autonomous inventory counting and tracking (AICT) system and securing the container units in the AICT system a biasing mechanism or similar element. In some embodiments, the biasing mechanism is a constant force spring coupled to a stopper. The AICT system identifies the total length occupied by the container units in the AICT system and uses previously determined information regarding a single container unit (e.g., the thickness of the container unit), to determine inventory data. The inventory data provides a user (e.g.,

5

employee or manager) information related to the total number of container units stored within the AICT system. In short, the AICT system uses distance measurements to determine how many container units are stored in the AICT system. The inventory data can be used by the AICT system to increase efficiency and accuracy of the inventory system. For example, the inventory data can be communicated (e.g., displayed, transmitted, printed, etc.) to an employee taking inventory or it can be uploaded to an online database that can be accessed by store owners and/or store suppliers.

As used herein, the term “container unit” refers to a singular consumer good. For example, a container unit could refer to, but is not limited to, a pack of cigarettes, a can of chewing tobacco, a box of breath mints, a pack of gum, a bottled beverage, a box or bottle of over the counter drugs, a tube of toothpaste, a pack of toilet paper, a roll of paper towel, a bag of coffee, a case of beer, a bottle of liquor, a bag of chips, a granola or protein bar, a carton of milk, a can of food, a box of personal hygiene or grooming products, a bag of pet food, a package of frozen food, a stick of deodorant, and other items sold at a convenience store having a set or standard size. While the present application may refer to embodiments that are used for tracking the inventory of cigarettes, it will be appreciated that this is an example embodiment and that the method and systems described herein can be modified to accommodate a wide variety of consumer goods including the tracking of an inventory of goods in a vending machine.

As used herein, the term “inventory data” refers generally to information about one or more container units. Inventory data includes the total number of container units in the AICT system at a given time (e.g., date, day, month, year, etc.). In some embodiments, inventory data includes a time stamp that connects the removal of a container unit from an AICT system with a time; information about the container unit, including the price, age, weight, brand, flavor, and any other defining characteristic of the container unit; a location of the product within the store or on the shelf; information such as the time a product was placed in the AICT system; and other container unit information.

As used herein, the term “the inventory count” refers generally to the total number of container units in the AICT system at a given time. The inventory count may be represented as an integer. In some embodiments, the inventory count may not be represented by an integer. As will be appreciated, the inventory count is a type of inventory data. The inventory count may be collected by the AICT system. In some embodiments, the inventory count is captured by an employee taking inventory.

As used herein, the term “taking inventory” refers to the action of collecting the inventory data, including the inventory count. Taking inventory may be carried out by a person, such as an employee or a convenience store owner. Taking inventory may be carried out by the AICT system. For example, taking inventory may be carried out by a microprocessor, computer board/computer unit, or a sensor of the AICT system.

The ability to actively track inventory is advantageous for several reasons. By actively tracking inventory and uploading inventory data to an online database, it is much easier for convenience store owners to determine when theft of the container unit occurs because the exact time that each container unit is removed from the AICT system can be recorded. This prevents convenience store owners from having to review hours of security camera footage and gives them the ability to pinpoint the time when a stolen item was removed from the AICT system. Additionally, the AICT

6

system makes it possible for inventory to be tracked remotely. This allows convenience store employees to spend less time taking inventory and spend more time improving the customers’ shopping experience. Tracking inventory using the AICT system also makes it possible for convenience store owners that own multiple stores to track the inventory in all their stores from one location. Store owners are further able to determine buying trends and adjust inventory based on those trends. For example, if cigarette sales are typically higher during times of good weather, a convenience store owner will be better equipped to stock the store with the proper number of cigarettes based on the collected inventory data. This also gives convenience stores the ability to automatically order more container units once the number of container units in store drops below a certain threshold. For example, every time there are less than fifty packs of cigarettes, the AICT system can automatically send an order to a supplier for more cigarettes. For all of these reasons, it is advantageous to actively track inventory.

Referring to FIGS. 1-2, a dispenser **100** is shown, according to an example embodiment. The dispenser **100** may be used to store and/or display consumer goods in a convenience store. The dispenser **100** is able to display and dispense items that vary in size, such as items varying from packs of gum to cereal boxes. Typically, a plurality of dispensers **100** are lined up on a shelf in close proximity to each other, displaying the consumer goods and making the consumer goods easy to access.

The dispenser **100** may be removably coupled to a surface **104**. The surface **104** may be a shelf on a shelving unit, a countertop, a table, or any similar surface. The dispenser **100** may be coupled to the surface **104** to prevent the dispenser **100** from moving while the dispenser **100** is in use.

The dispenser includes a body **108**, a container unit **120**, a first ledge **130**, a second ledge **140**, a stopper **150**, a track **170**, and a biasing member **180**. The body **108** is configured to accept consumer goods and hold them in an orientation determined by a convenience store owner or employee. In various embodiments, the body **108** may be a part, a shell, or a piece. In some embodiments, the body **108** interfaces with the surface **104**. In some embodiments, the body **108** is manufactured from clear plastic to improve the visibility of the consumer goods. In other embodiments, the body **108** is manufactured from wood, metal, glass, or any other material. In some embodiments, the body **108** is decorated to make the dispenser **100** visually appealing to the consumer.

The body **108** of the dispenser **100** includes a first ledge **130** and a second ledge **140**. The second ledge **140** is spaced laterally away from the first ledge **130**, such that the first ledge **130** and the second ledge **140** are substantially parallel to each other. The first ledge **130** is disposed on a first end **110** of the body **108** and defines the first end **110** of the body **108**. The second ledge **140** defines a second end **112** of the body **108** and is opposite the first end **110** and opposite the first ledge **130**. The body **108** extends between the first ledge **130** and the second ledge **140**. The first ledge **130** and the second ledge **140** are positioned such that at least one container unit **120** can fit between the first ledge **130** and the second ledge **140**.

The stopper **150** is slidably coupled to the body **108**. The stopper **150** is configured to slide relative to the body **108** between the first ledge **130** and the second ledge **140** along the track **170**. The stopper **150** is structured to secure a container unit **120** within the body **108** of the dispenser **100**.

The stopper **150** includes a first face **160** and a second face **165**. The first face **160** interfaces with the container unit **120**, securing the container unit **120** in the body **108** of the

7

dispenser **100**. The first face **160** is structurally integrated with the stopper **150**. In some embodiments, the first face **160** is coupled to the stopper **150**. The second face **165** is positioned opposite to the first face **160** and is structurally integrated with the stopper **150**. The second face **165** may not interface with the container unit **120**. In some embodiments, the second face **165** interfaces with the container unit **120**. When a container unit **120** is placed in the dispenser **100**, it is understood that the container unit **120** is placed between the second ledge **140** and the first face **160** such that the first face **160** interfaces with the container unit **120**.

The track **170** is positioned between the first ledge **130** and the second ledge **140**, extending the length of the body **108**. The track **170** may be structurally integrated with the body **108**. In some embodiments, the track **170** is manufactured separate from the body **108** and later coupled to the body **108**. The track **170** is configured to accept at least a portion of the stopper **150** and to facilitate the translational sliding of the stopper **150** between the first ledge **130** and the second ledge **140**.

The biasing member **180** may be coupled to the second ledge **140** and stopper **150** such that the stopper **150** is biased toward the second ledge **140** by a force applied by the biasing member **180**. While the biasing member **180** biases the stopper **150** toward the second ledge **140**, the biasing member **180** allows for translational movement of the stopper **150** toward the first ledge **130**. In some embodiments, the biasing member is a constant force spring. In other embodiments, the stopper **150** is biased toward the second ledge **140** by a force applied by gravity. In some embodiments, the biasing member is a threaded rod, screw, motorized member, mechanical coil, or similar movement inducing members.

Referring to FIG. 3, a perspective view of the container unit **120** is shown. The container unit **120** has a height **121**, a width **122**, and a depth **123**. To properly count the container unit **120**, a single container unit distance **125** is defined. The single container unit distance **125** is equal to at least one of the height **121**, the width **122**, or the depth **123**. In the case of the container unit **120**, the single container unit distance **125** is equal to the depth **123**.

A container unit **120** is configured to be placed into the body **108** along the track **170**. The container unit **120** may be a container unit **120** as shown in FIG. 3, and discussed in greater detail below. The container unit **120** is configured to interface with the body **108** such that the container unit **120** may be removed from the body **108** by a consumer or employee and/or replaced in the body **108** by a consumer or employee. In some embodiments, the container unit **120** is substantially box-like. In other embodiments, the container unit **120** has a non-conventional geometry, such as a star or a pyramid. In those embodiments, the dispenser **100** is modified to accommodate the non-conventional geometry.

As will be appreciated, when the container unit **120** is placed between the second ledge **140** and the first face **160** of the stopper **150** the stopper **150** is biased (e.g., forced, moved, pushed, translated, etc.) a distance equal to the single container unit distance **125** toward the first ledge **130** by the force applied by the biasing member **180**. The force applied by the biasing member **180** on the stopper **150** causes the first face **160** to interface with the container unit **120** such that the container unit **120** is securely held in place between the stopper **150** and the second ledge **140**. As more container units **120** are added between the second ledge **140** and the stopper **150** by an installation force (applied by a person inserting the container unit **120**), the stopper **150** moves toward the first ledge **130**. This movement of the

8

stopper **150** causes the biasing member **180** (e.g., coil spring) to unravel and acquire elastic potential energy. When the container unit **120** is removed from the dispenser **100**, the biasing member **180** biases the stopper **150** toward the second ledge **140** the distance equal to the single container unit distance **125**. As the stopper **150** moves toward the second ledge **140**, the biasing member **180** coils up, releasing elastic potential energy.

Referring to FIG. 4, an AICT system **185** is shown, according to a first exemplary embodiment. The AICT system **185** includes the dispenser **100** and an identifier **190**. The identifier **190** may be a shape, QR code, barcode, color, reflector, dot matrix, image, color, code, number, numeral, or other representation of the number of container units **200** in a dispenser **100**.

The identifier **190** is displayed (e.g., shown, seen, etc.) on the biasing member **180**. The identifier **190** may change in response to the removal of the container unit **120** from the dispenser **100** of the AICT system **185** or the addition of the container unit **120** to the dispenser **100** of the AICT system **185**. The identifier **190** may be coupled (e.g., attached) to the biasing member **180** using glue, fasteners, welding connections, or any other coupling method. In some embodiments, the identifier **190** is formed as a single piece with the biasing member **180** through a process such as engraving, embossing, stamping, or any similar process. In other embodiments, the identifier **190** is drawn on (e.g., written on, sketched on, etc.) using a marker, paint, pencil, pen, or any other marking tool.

The AICT system **185** includes a plurality of container units **200**. The plurality of container units **200** are stocked (e.g., disposed, placed, located, etc.) in the body **108**. Each of the plurality of container units **200** is substantially the same geometric size and shape. More specifically, each of the plurality of container units **200** is defined by the single container unit distance **125**. The AICT system **185** relies on the consistency of the single container unit distance **125** to measure the inventory count. The plurality of container units **200** are positioned in the body **108** such that the single container unit distance **125** of each of the plurality of container units **200** runs substantially parallel to the track **170**. Consistent placement and orientation of the plurality of container units **200** within the AICT system **185** allows the AICT system **185** to autonomously measure the inventory count both reliably and repeatedly.

As shown in FIG. 4, the stopper **150** is displaced from the second ledge **140** a distance equal to approximately five times the single container unit distance **125**. The biasing member **180** applies a force to the stopper **150** in a direction toward the second ledge **140**. The first face **160**, biased by the force applied by the biasing member **180**, interfaces with at least one of the plurality of container units **200** such that the plurality of container units **200** are securely held in the body **108**. The biasing member **180** displays the identifier **190** to a person taking inventory (or in other embodiments, a camera, reflective surface, etc.), the identifier corresponding to the inventory count. As shown in FIG. 4, the identifier **190** displays the number "5".

Referring to FIGS. 5A and 5B, the loading/unloading of a container unit **120** into the AICT system **185** is shown. When the container unit **120** is removed from the AICT system **185**, the stopper **150** is biased by the biasing member **180**, the stopper **150** moving toward the second ledge **140**. As a result of the movement of the stopper **150**, the biasing member **180** rolls up, hiding at least a portion of the biasing member **180** that had been exposed before the movement of the stopper **150**. The identifier **190** is exposed and visible to

a person taking inventory (or in other embodiments, a camera, reflective surface, etc.). As shown in FIG. 5A, the AICT system 185 at the first position 502 has the identifier 190 exposed and displays the number “2”. When the container unit 120 is added to the AICT system 185 the AICT system 185 transitions to the second position 504. In the second position 504, the stopper 150 is biased by the container unit 120 toward the first ledge 130 (not shown). As a result of the movement of the stopper 150, the biasing member 180 unwinds (e.g., rotates), exposing at least a portion of the biasing member 180 that had been hidden before the movement of the stopper 150. The identifier 190 is exposed and visible to a person taking inventory. In the second position 504, the identifier 190 is exposed and displays the number “3”. If the single container unit distance 125 of the container unit 120 is known, then the biasing member 180 may be labeled with the identifier 190 such the identifier 190 corresponds to the inventory count. In some cases, a configuration of the biasing member 180 will be necessary before the AICT system 185 can be used for taking inventory.

Referring to FIG. 5B a bottom view of the dispenser 100 is shown. The dispenser 100 contains the plurality of container units 200 and the biasing member 180 contains a plurality of identifiers 195. In some embodiments, the identifiers 195 are engraved or embossed directly on the biasing member 180 rather than inside. Each of the plurality of identifiers 195 correspond to the inventory count. The biasing member 180 is configured to make no more than one of the plurality of identifiers 195 visible at any given time. Each one of the plurality of identifiers 195 corresponds to one of the plurality of container units 200. If, for example, the dispenser 100 of the AICT system 185 holds ten of the plurality of container units 200 when at capacity, the biasing member 180 will have ten of the plurality of identifiers 195.

As will be appreciated, when the first face 160 of the AICT system 185 is displaced from the second ledge 140 a distance equal to three times the single container unit distance 125, the identifier 190 displays the number “3”. By displaying the identifier 190 corresponding to the inventory count, a person taking inventory can quickly and accurately record the inventory count without having to individually count each of the plurality of container units 200 disposed within the AICT system 185. Similarly, when the first face 160 of the AICT system 185 is a distance equal to the single container unit distance 125 from the second ledge 140, the identifier 190 displays the number “1”. By displaying the identifier 190 corresponding to the inventory count, a person taking inventory can quickly and accurately record the inventory count without having to count each of the plurality of container units 200 disposed within the AICT system 185.

Referring to FIG. 6, a method 600 of configuring the AICT system 185 is shown, according to an exemplary embodiment. At (605), the dispenser 100 of the AICT system 185 is filled with the plurality of container units 200 until the dispenser 100 of the AICT system 185 is at capacity. The plurality of container units 200 may be similarly oriented within the dispenser 100 such that the dimension corresponding to the single container unit distance 125 is substantially parallel to the track 170.

At (610), the identifier 190 is disposed on the biasing member 180 such that the identifier 190 is visible to a person taking inventory. The identifier 190 may be at least one of drawn on, coupled to, or structurally integrated with the biasing member 180. The identifier 190 disposed on the biasing member 180 corresponds to the inventory count.

At (615), the AICT system 185 is checked. If the AICT system 185 is empty, meaning that none of the plurality of container units 200 is disposed within the dispenser 100 of the AICT system 185, then the configuration is complete. If there is at least one of the plurality of container units 200 disposed within the AICT system 185, then the method of configuration continues to (620).

At (620), one of the plurality of container units 200 is removed from the AICT system 185, and (610) is repeated until the AICT system 185 is empty at (625).

To configure the AICT system 185 such that the identifier 190 corresponds to the inventory count, the plurality of container units 200 is disposed within the AICT system 185 while the identifier 190 is added to the biasing member 180. If three of the plurality of container units 200 are disposed within the AICT system 185, then, in some embodiments, the identifier 190 displaying the number “3” may be added to the biasing member 180 such that it is visible to a person taking inventory. Once the identifier 190 displaying ‘3’ is added to the biasing member 180, then one of the plurality of container units 200 still remaining in the AICT system 185 is removed such that only two of the plurality of container units 200 still remain within the AICT system 185. If two of the plurality of container units 200 are disposed within the AICT system 185, then, in some embodiments, the identifier 190 displaying the number “2” may be added to the biasing member 180. This process is repeated until zero of the plurality of container units 200 remain within the AICT system 185.

In some embodiments, the identifier 190 disposed on the biasing member 180 may not be easily visible to a person taking inventory of consumer goods. In such circumstances, it may be necessary for the employee to relocate the AICT system 185 relative to the surface 104 to see the identifier 190 on the biasing member 180. This can cause taking inventory to be time consuming and possibly dangerous should the consumer goods disposed within the AICT system 185 be exceptionally heavy or containing hazardous materials.

Referring to FIG. 7, an AICT system 285 is shown, according to another exemplary embodiment. The AICT system 285 is similar to the AICT system 185. A difference between the AICT system 285 and the AICT system 185 is the AICT system 285 includes a reflective surface (e.g., a mirror, polished chrome, etc.) 210. Accordingly, similar features between the AICT system 185 and the AICT system 285 have similar numbering. The reflective surface 210 allows a user to see a reflection 220 of the identifier 190. This allows a person taking inventory to see the identifier 190 without having to relocate the AICT system 285 relative to the surface 104. The reflective surface 210 may be coupled to a wall, a shelf, or the dispenser 100. Further, lighting elements 225 may be added to the surrounding environment to improve visibility of the identifier 190.

Referring to FIG. 8, an AICT system 385 is shown, according to another exemplary embodiment. The AICT system 385 is similar to the AICT system 185. A difference between the AICT system 385 and the AICT system 185 is the AICT system 385 includes a camera 230 (e.g., sensor). Accordingly, similar features between the AICT system 185 and the AICT system 385 have similar numbering. In some embodiments, the camera 230 may be implemented with a microprocessor 240, a computing system, and/or a microcontroller. The camera 230 may be coupled to the first end 110 of the dispenser 100. In other embodiments, the camera 230 is coupled to a wall or a shelf. The camera 230 is configured to record (e.g., face, see, capture, look at, etc.) the

11

identifier **190** displayed on the biasing member **180**. Implementing the camera **230** is especially advantageous when both the identifier **190** and the reflective surface **210** are hidden from the view of a person taking inventory. The microprocessor **240** is configured to control the camera **230**, the microprocessor **240** further configured to convert the identifier **190** recorded by the camera **230** to a digital signal. The digital signal may be stored in a memory as inventory data. In some embodiments, the digital signal may be uploaded to an online database to allow for active inventory tracking and data storage. Tracking inventory using the camera **230** and the microprocessor **240** allows a convenience store owner to actively track inventory in real-time instead of tracking inventory by reviewing hand-written inventory records. Beneficially, the camera **230** may be configured to view multiple rows (e.g., multiple tracks **170** each with their own stopper **150** and container units **120** disposed between the stopper **150** and second ledge **140**).

Turning to FIG. 9, an AICT system **485** is shown, according to another exemplary embodiment. The AICT system **485** is similar to the AICT system **185**. A difference between the AICT system **485** and the AICT system **185** is the AICT system **485** includes a distance sensor **255**. Accordingly, similar features between the AICT system **185** and the AICT system **485** have similar numbering. The distance sensor **255** is coupled to the second face **165** the stopper **150**. The distance sensor **255** measures a container unit distance **260**. The available container unit distance **260** is defined as the distance between the second face **165** and the first ledge **130**. In some embodiments, the AICT system **485** includes the distance sensor **255** coupled to the first ledge **130**, the distance sensor **255** measuring the available container unit distance **260**.

The AICT system **485** also includes the microprocessor **240**. In some embodiments, the microprocessor **240** is configured to control the distance sensor **255**. In some embodiments, the microprocessor **240** is further configured to communicate with the distance sensor **255** through a wireless communication method. In some embodiments, the microprocessor **240** communicates with the distance sensor **255** through a wired connection. In other embodiments, the distance sensor **255** is integrated with the microprocessor **240**.

Stored within a memory of the microprocessor **240** is a maximum container unit distance **270**. The maximum container unit distance **270** is defined as the distance between the first face **160** and second ledge **140** when the AICT system **485** is at full capacity (e.g., completely filled with the plurality of container units **200**). The maximum container unit distance **270** is either pre-determined or determined during a configuration of the AICT system **485**. The maximum container unit distance **270** may be configured before the AICT system **485** takes inventory reliably and repeatedly. The maximum container unit distance **270** may be re-configured each time the AICT system **485** is used to stock (e.g., hold, display, accept, store, etc.) a different consumer product (e.g., a consumer product that varies in size when compared to the consumer product used for a previous configuration). However, reconfiguration would not be necessary if the AICT system **485** is being restocked (e.g., refilled, resupplied, etc.) with the same product used for the previous configuration.

The microprocessor **240** is further configured to determine a total container unit distance **280**. The total container unit distance **280** is defined as the absolute value of the difference between the maximum container unit distance **270** and the available container unit distance **260**. In some

12

embodiments, the total container unit distance **280** is directly measured by the distance sensor **255**, the distance sensor **255** measuring the distance between the second ledge **140** and the first face **160**.

The microprocessor **240** is configured to determine the inventory count using the single container unit distance **125** and the total container unit distance **280**, the microprocessor **240** dividing the total container unit distance **280** by the single container unit distance **125**. The microprocessor **240** transmits the inventory count to a display **290**. The display **290** is coupled to the second ledge **140** such that it is visible to a person taking inventory. In some embodiments, the display **290** is separate from the AICT system **485**, such as, for example, a computer monitor in an office. In other embodiments, the display **290** is an electronic display screen (e.g., mobile computing device screen, computing device screen, etc.). The display **290** displays the identifier **190** corresponding to the inventory count. In some embodiments, the microprocessor **240** may save the inventory data to the memory to be recalled at a later time. In other embodiments, the microprocessor **240** may upload the inventory count to an online database, allowing the inventory count to be actively tracked from a remote location.

Turning to FIG. 10, an AICT system **585** is shown, according to another exemplary embodiment. The AICT system **585** is similar to the AICT system **185**. A difference between the AICT system **585** and the AICT system **185** is the AICT system **585** includes a plunger **550** that is configured to engage (e.g., pop-out) plurality of tabs as the identifier **590**. In some embodiments, a distance sensor **255** may be implemented such that the distance sensor **255** is coupled to the second face **165** the stopper **150**. Accordingly, similar features between the AICT system **185** and the AICT system **585** have similar numbering.

The plunger **550** is coupled to the stopper **150** and is configured to engage the identifier tabs **590** that are disposed along the track **170**. The identifier tabs **590** are numbered to indicate the number of container units **120** remaining along the track **170**. As container units **120** are added or removed, causing the stopper **150** to move along the track **170**, the plunger **550** comes into contact and pushes out the identifier tabs **590**. The identifier tabs **590** are structured to be viewable by a user as they are engaged by the plunger. As shown in FIG. 10, when the AICT system **585** is at a first position **1002**, the plunger **550** engages an identifier tab **590** with the number "3" and the identifier tab **590** is viewable. As two more container units **120** are added along the track **170**, the AICT system **585** moves to a second position **1004** causing the plunger **550** to engage an identifier tab **590** with the number "5" such that the identifier tab **590** is viewable by a user. In some embodiments, the identifier tabs **590** are disposed on a top portion/structure of the AICT system **585** and are configured to pop-up when the plunger **550** contacts the identifier tab **590**.

Referring to FIG. 11, a method **1100** of configuring an AICT system is shown, according to an exemplary embodiment. The AICT system may be any one of the AICT systems **185**, **285**, **384**, **485**, **585** of FIGS. 1-10. At (**1105**), the single container unit distance **125** is determined. The single container unit distance **125** may be determined by a person using a measuring instrument, such as calipers, or the single container unit distance **125** may be determined by the manufacturer of the container unit **120**.

At (**1110**), the maximum container unit distance **270** is determined. The maximum container unit distance **270** may be determined by a person using a measuring instrument, such as calipers. In some embodiments, the maximum

13

container unit distance **270** is determined by the distance sensor **255** and the microprocessor **240** of the AICT system **185**.

At **(1115)**, both the single container unit distance **125** and the maximum container unit distance **270** are stored on the memory of the microprocessor **240** to be recalled at a later time, as shown at **(1215)** of FIG. **12**, described below. In some embodiments, it is necessary to manually program the single container unit distance **125** and the maximum container unit distance **270** into the memory of the microprocessor **240**.

At **(1120)**, the plurality of container units **200** is stored within the dispenser **100** of the AICT system **185**. The plurality of container units **200** are secured within the dispenser **100** of the AICT system **185** by the stopper **150**. The stopper **150** may be biased by the biasing member **180** such that the first face **160** interfaces with at least one of the plurality of container units **200**.

The maximum container unit distance **270** may be easier to measure when the dispenser **100** of the AICT system **185** is filled to capacity with the plurality of container units **200**. Once one of the plurality of container units **200** has been removed from the dispenser **100** of the AICT system **185**, the maximum container unit distance **270** may only be determined through extrapolation of the total container unit distance **280** and the single container unit distance **125**, which may be inaccurate when compared to the maximum container unit distance **270** directly measured during **(1110)**.

The microprocessor **240** will later recall the single container unit distance **125** and the maximum container unit distance **270** from the memory after controlling the distance sensor **255** to measure the available container unit distance **260**.

Referring to FIG. **12**, a method **1200** of autonomously taking inventory with an AICT system is shown, according to an exemplary embodiment. The AICT system may be any one of the AICT systems **185**, **285**, **384**, **485**, **585** of FIGS. **1-10**. At **(1205)**, the microprocessor **240** receives a signal to take inventory. In some embodiments, the signal may originate from a person taking inventory in the form of a voice command or a button press. In other embodiments, the signal is generated by a computer. In other embodiments, the computer generates a signal according to a schedule used for facilitating times for the collection of inventory data.

At **(1210)**, the microprocessor **240** controls the distance sensor **255** to determine the available container unit distance **260**. In other embodiments, the microprocessor **240** controls the distance sensor **255** to determine the total container unit distance **280**.

At **(1215)**, the microprocessor **240** recalls the single container unit distance **125** and the maximum container unit distance **270** from the memory. In some embodiments, the single container unit distance **125** is determined at **(1105)** of method **1100** of FIG. **11**, described above. In other embodiments, the maximum container unit distance **270** is determined at **(1110)** of method **1100** of FIG. **11**, described above.

At **(1220)**, the microprocessor **240** subtracts the available container unit distance **260** from the maximum container unit distance **270** to determine the total container unit distance **280**. In some embodiments, the total container unit distance **280** is stored in the memory. In other embodiments, the total container unit distance **280** is measured using the distance sensor **255**. In some embodiments, the distance sensor **255** is coupled to an arm or similar feature of the AICT system and is configured to move along with the movement of the arm.

14

At **(1225)**, the microprocessor **240** divides the total container unit distance **280** by the single container unit distance **125** to determine the inventory count. In some embodiments, the microprocessor **240** rounds the quotient of the total container unit distance **280** and the single container unit distance **125** to the nearest integer, storing the result in the memory as the inventory count.

At **(1230)**, the microprocessor **240** uploads the inventory count to an online database that may be accessed by a computer. In some embodiments, the microprocessor **240** controls the display **290** to display the inventory count such that the inventory count is visible to a person taking inventory.

The microprocessor **240** controls the distance sensor **255** to measure the available container unit distance **260**, which is, in simple terms, the empty space in the dispenser **100** of the AICT system **185**. The microprocessor **240** determines how much space within the dispenser **100** is filled with the plurality of container units **200** (shown as the total container unit distance **280**) by subtracting the available container unit distance **260**, measured by the distance sensor **255**, from the maximum container unit distance **270**, recalled from memory. After solving for the total container unit distance **280**, the microprocessor **240** divides the total container unit distance **280** by the single container unit distance **125**, the single container unit distance **125** recalled from memory; the result is the inventory count. The inventory count may then be uploaded to an online database and/or displayed on the display **290**.

While the AICT systems **185**, **285**, **384**, **485**, **585** of FIGS. **1-10** are described with respect to a container unit/track system, it will be appreciated that any one of the AICT systems **185**, **285**, **384**, **485**, **585** could be implemented with a vending machine. Currently, most vending machines have the container/consumer products stacked or placed behind each other. The AICT system could be implemented within the vending machine such that the distance sensor, camera, or other visual hardware, with a microprocessor can track the purchase of items in the vending machine. Typically, vending machines utilize a coil mechanism that move as vending items are selected and dispensed. The AICT system may be implemented such that each cavity in the coil mechanism is used to identify an amount of vending units left in a row of a vending machine. In some embodiments, the AICT system is configured to track purchasing of individual items (e.g., popularity) and/or to facilitate re-stock of low inventoried items. As will be readily apparent, other vending machine configuration could have the AICT system implemented within the dispensing mechanism to track inventory.

While this specification contains many specific implementation details, these should not be construed as limitations on the scope of what may be claimed but rather as descriptions of features specific to particular implementations. Certain features described in this specification in the context of separate implementations can also be implemented in combination in a single implementation. Conversely, various features described in the context of a single implementation can also be implemented in multiple implementations separately or in any suitable subcombination. Moreover, although features may be described as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can, in some cases, be excised from the combination, and the claimed combination may be directed to a subcombination or variation of a subcombination.

As utilized herein, the terms “substantially” and similar terms are intended to have a broad meaning in harmony with the common and accepted usage by those of ordinary skill in the art to which the subject matter of this disclosure pertains. For example, the term “substantially” refers to within 5% of the recited feature. It should be understood by those of skill in the art who review this disclosure that these terms are intended to allow a description of certain features described and claimed without restricting the scope of these features to the precise numerical ranges provided. Accordingly, these terms should be interpreted as indicating that insubstantial or inconsequential modifications or alterations of the subject matter described and claimed are considered to be within the scope of the invention as recited in the appended claims.

The terms “coupled,” “connected,” and the like, as used herein, mean the joining of two components directly or indirectly to one another. Such joining may be stationary (e.g., permanent) or moveable (e.g., removable or releasable). Such joining may be achieved with the two components or the two components and any additional intermediate components being integrally formed as a single container unitary body with one another, with the two components, or with the two components and any additional intermediate components being attached to one another. Examples of connections or configurations for connecting may include piping, channels, or any other suitable components for enabling the flow of a fluid from one component or object to another.

The embodiments described herein have been described with reference to drawings. The drawings illustrate certain details of specific embodiments that implement the systems, methods and programs described herein. However, describing the embodiments with drawings should not be construed as imposing on the disclosure any limitations that may be present in the drawings.

It should be understood that no claim element herein is to be construed under the provisions of 35 U.S.C. § 112(f), unless the element is expressly recited using the phrase “means for.”

As used herein, the term “circuit” may include hardware structured to execute the functions described herein. In some embodiments, each respective “circuit” may include machine-readable media for configuring the hardware to execute the functions described herein. The circuit may be embodied as one or more circuitry components including, but not limited to, processing circuitry, network interfaces, peripheral devices, input devices, output devices, sensors, etc. In some embodiments, a circuit may take the form of one or more analog circuits, electronic circuits (e.g., integrated circuits (IC), discrete circuits, system on a chip (SOCs) circuits, etc.), telecommunication circuits, hybrid circuits, and any other type of “circuit.” In this regard, the “circuit” may include any type of component for accomplishing or facilitating achievement of the operations described herein. For example, a circuit as described herein may include one or more transistors, logic gates (e.g., NAND, AND, NOR, OR, XOR, NOT, XNOR, etc.), resistors, multiplexers, registers, capacitors, inductors, diodes, wiring, and so on).

The “circuit” may also include one or more processors communicatively coupled to one or more memory or memory devices. In this regard, the one or more processors may execute instructions stored in the memory or may execute instructions otherwise accessible to the one or more processors. In some embodiments, the one or more processors may be embodied in various ways. The one or more processors may be constructed in a manner sufficient to

perform at least the operations described herein. In some embodiments, the one or more processors may be shared by multiple circuits (e.g., circuit A and circuit B may comprise or otherwise share the same processor which, in some example embodiments, may execute instructions stored, or otherwise accessed, via different areas of memory).

Alternatively or additionally, the one or more processors may be structured to perform or otherwise execute certain operations independent of one or more co-processors. In other example embodiments, two or more processors may be coupled via a bus to enable independent, parallel, pipelined, or multi-threaded instruction execution. Each processor may be implemented as one or more general-purpose processors, application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), digital signal processors (DSPs), or other suitable electronic data processing components structured to execute instructions provided by memory. The one or more processors may take the form of a single core processor, multi-core processor (e.g., a dual core processor, triple core processor, quad core processor, etc.), microprocessor, etc. In some embodiments, the one or more processors may be external to the apparatus, for example the one or more processors may be a remote processor (e.g., a cloud based processor). Alternatively or additionally, the one or more processors may be internal and/or local to the apparatus. In this regard, a given circuit or components thereof may be disposed locally (e.g., as part of a local server, a local computing system, etc.) or remotely (e.g., as part of a remote server such as a cloud based server). To that end, a “circuit” as described herein may include components that are distributed across one or more locations.

An exemplary system for implementing the overall system or portions of the embodiments might include a general purpose computing computers in the form of computers, including a processing container unit, a system memory, and a system bus that couples various system components including the system memory to the processing container unit. Each memory device may include non-transient volatile storage media, non-volatile storage media, non-transitory storage media (e.g., one or more volatile and/or non-volatile memories), a distributed ledger (e.g., a blockchain), etc. In some embodiments, the non-volatile media may take the form of ROM, flash memory (e.g., flash memory such as NAND, 3D NAND, NOR, 3D NOR, etc.), EEPROM, MRAM, magnetic storage, hard discs, optical discs, etc. In other embodiments, the volatile storage media may take the form of RAM, TRAM, ZRAM, etc. Combinations of the above are also included within the scope of machine-readable media. In this regard, machine-executable instructions comprise, for example, instructions and data which cause a general purpose computer, special purpose computer, or special purpose processing machines to perform a certain function or group of functions. Each respective memory device may be operable to maintain or otherwise store information relating to the operations performed by one or more associated circuits, including processor instructions and related data (e.g., database components, object code components, script components, etc.), in accordance with the example embodiments described herein.

It should be noted that although the diagrams herein may show a specific order and composition of method steps, it is understood that the order of these steps may differ from what is depicted. For example, two or more steps may be performed concurrently or with partial concurrence. Also, some method steps that are performed as discrete steps may be combined, steps being performed as a combined step may be

17

separated into discrete steps, the sequence of certain processes may be reversed or otherwise varied, and the nature or number of discrete processes may be altered or varied. The order or sequence of any element or apparatus may be varied or substituted according to alternative embodiments. Accordingly, all such modifications are intended to be included within the scope of the present disclosure as defined in the appended claims. Such variations will depend on the machine-readable media and hardware systems chosen and on designer choice. It is understood that all such variations are within the scope of the disclosure. Likewise, software and web implementations of the present disclosure could be accomplished with standard programming techniques with rule based logic and other logic to accomplish the various database searching steps, correlation steps, comparison steps and decision steps.

The foregoing description of embodiments has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from this disclosure. The embodiments were chosen and described in order to explain the principals of the disclosure and its practical application to enable one skilled in the art to utilize the various embodiments and with various modifications as are suited to the particular use contemplated. Other substitutions, modifications, changes and omissions may be made in the design, operating conditions and arrangement of the embodiments without departing from the scope of the present disclosure as expressed in the appended claims.

It is important to note that the construction and arrangement of the system shown in the various example implementations is illustrative only and not restrictive in character. All changes and modifications that come within the spirit and/or scope of the described implementations are desired to be protected. It should be understood that some features may not be necessary, and implementations lacking the various features may be contemplated as within the scope of the application, the scope being defined by the claims that follow. When the language a "portion" is used, the item can include a portion and/or the entire item unless specifically stated to the contrary.

What is claimed:

1. A method of tracking inventory comprising:
 - providing a dispenser comprising:
 - a body laterally extending between a first end and a second end;
 - a stopper slidably coupled to the body to move between the first end and the second end;
 - a biasing member coupled to the stopper to bias the stopper towards the second end, wherein a plurality of identifiers are displayed on the biasing member;
 - securing a plurality of units within the dispenser between the stopper and the second end;
 - displaying at least one of the plurality of identifiers to a user of the dispenser, the at least one of the plurality of identifiers corresponding to a total number of units in the dispenser; and
 - displaying, on a reflecting surface, a reflection of the at least one of the plurality of identifiers, wherein the reflecting surface is fixed to the first end of the body of the dispenser,
- wherein the stopper moves relative to the reflecting surface.
2. The method of claim 1, wherein the biasing member includes a substantially constant force spring.

18

3. The method of claim 1, further comprising:
 - sensing, by a distance sensor, a distance between the stopper and the first end; and

- determining, by a controller operably coupled to the distance sensor, a total number of units based on the distance and a width of a unit.

4. The method of claim 3, further comprising uploading, via the controller, the total number of units to an online database, the online database accessible from a remote location.

5. The method of claim 3, further comprising:
 - recording, via the controller, an inventory count over a period of time; and

- transmitting, via the controller, a notification to a user device, the notification comprising the total number of units.

6. The method of claim 1, further comprising:
 - measuring, with a sensor coupled to the body, a distance between the stopper and the first end;

- determining, with a controller operably coupled to the sensor, the total number of units based in part on the distance; and

- providing, via the controller, the total number of units to an online database.

7. The method of claim 1, further comprising:
 - measuring, with a sensor coupled to the body, a distance between the stopper and the first end;

- providing a controller with a single container unit distance; and

- determining, with the controller, the total number of units based on the distance and the single container unit distance.

8. The method of claim 1, further comprising:
 - determining a maximum unit distance representing the total number of units that the body can contain between the stopper and the second end; and

- determining a total unit distance representing a difference between the maximum unit distance and an available container unit distance, the available container unit distance a distance between the stopper and the first end; and

- determining, based on the total unit distance and a single container unit distance, the total number of units in the dispenser.

9. The method of claim 8, wherein the single container unit distance is defined by the distance that the stopper moves when a unit is added to the dispenser.

10. An autonomous inventory counting and tracking (AICT) system, the system comprising:

- a dispenser configured to accept a plurality of units, the dispenser comprising:

- a body laterally extending between a first end and a second end;

- a reflecting surface fixed to the first end;

- a stopper slidably coupled to the body to move between the first end and the second end; and

- a biasing member coupled to the stopper to bias the stopper towards at least one of the first end or the second end, wherein one or more identifiers are displayed on the biasing member and reflected on the reflecting surface, wherein a first identifier of the one or more identifiers is visible, the first identifier based on a position of the first identifier on the extendable biasing member relative to a distance between the stopper and the second end,

- wherein the stopper moves relative to the reflecting surface.

19

11. The AICT system of claim **10**, the dispenser further comprising:

a distance sensor coupled to the body, the distance sensor configured to measure the distance between the stopper and the second end;

a controller configured to determine an inventory count using the distance and a single unit distance; and

a display configured to display the inventory count, wherein the controller is configured to control the distance sensor and the display, and wherein the inventory count corresponds to a quantity of units in the dispenser.

12. The AICT system of claim **11**, wherein the display is separate from the dispenser, and wherein the controller is configured to wirelessly communicate with the display.

13. The AICT system of claim **11**, wherein the controller is communicably coupled to a remote database and configured to transmit the inventory count to the remote database.

14. The AICT system of claim **11**, wherein the controller is configured to record the inventory count over a period of time and transmit a notification to a user device, the notification comprising the inventory count.

15. The AICT system of claim **10**, wherein the biasing member is a rolled coil of metal, the rolled coil of metal comprising a first coil end coupled to the second end and a second coiled end coupled to the stopper.

20

16. The AICT system of claim **10**, wherein the dispenser further comprises a track supported by the body, the track positioned between the first end and the second end and extending along the body.

17. The AICT system of claim **10**, further comprising: a plurality of units supported by the body, the plurality of units positioned between the stopper and the second end,

wherein a length of the biasing member depends on a quantity of the plurality of units, and

wherein the first identifier of the one or more identifiers is visible based on the length of the biasing member.

18. The AICT system of claim **10**, further comprising:

a camera configured to capture an image including the first identifier visible on the biasing member; and

a controller operably coupled to the camera, the controller configured to upload identify the first identifier in the image and upload the first identifier to an online database.

19. The AICT system of claim **10**, wherein the stopper is configured to move translationally toward the first end in response to a unit being added to the dispenser, and the stopper configured to move toward the second end in response to a unit being removed from the dispenser.

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