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(54) Title: AUTOMATED SYSTEM FOR SELF-SERVICE STORE

(57) Abstract: The claimed utility model refers to system refers to programmed control systems and can be used for the operations on sales of goods and products. According to solution, the sales and storage sector is divided by the partition into two separate compartments where the first compartment comprises at least one electronic unit for serving the purchasers and the second compartment comprises at least one electronic unit for the control of the warehousing department. Among the technical properties there is an enhancement of reliability of the system due to the presence of partitioned compartments.

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## AUTOMATED SYSTEM FOR SELF-SERVICE STORE

The claimed utility model refers to technical solutions intended for the storage of individual or ordered products at the warehouses and at the stores connected with mechanical devices of automatic control to detect products and goods to be removed. Besides, the claimed system refers to programmed control systems and can be used for the operations on sales of goods and products.

The store management system is known from the art, disclosed in US application US2018068368 (A1) dated 08.03.2018, comprising:

the storage system in the area of the back room of the retail outlet configured to store a plurality of items for sale;

the conveyor system configured to transport the items from the storage system to the item interaction facility in the sales outlet;

the feedback system; and

the control circuit linked to the conveyor system and feedback system wherein the control circuit is configured to:

receive an interaction request from the customer through the user interface device in the area of the show room of the retail outlet;

prompt the conveyor system to receive one or more items from the storage system and transport one or more elements to the item interaction area based on the interaction request;

receive the request for the return of at least one item from the customer;

prompt the reverse sensor system to collect data from at least one item;

determine whether the return request should be received based on the data collected by the feedback sensor system; and

in case if the return request is received, the conveyor system should receive at least one item from the customer and make at least one item available for another customer.

The drawbacks of the known solution include the low reliability of the system that is reflected in the use of one conveyor.

Therefore, there is a need for improvement of reliability of similar systems for self-service store.

The key objective of the technical solution is to create an automated system for self-service store, whose construction features allow addressing relevant drawbacks of existing systems. In this case, the technical solution gains new characteristics, both technical and user-specific.

The objective can be achieved thanks to the fact that the automated system for self-service store comprises:

- sales and storage sector, which is connected to the power supply source and which includes at least one electronic unit for the control of the warehousing department, system of transportation and distribution of goods,

- store window with samples of goods,

- at least one computer system of payment terminal,

- at least one fixed electronic digital scanner for scanning the goods selected by a purchaser, wherein

- each electronic unit for the for the control of the warehousing department comprises the mechanical guide of goods installed in each section for the storage of goods and coupled to the computer system of the payment terminal,

- payment terminal,

- besides, the system of transportation and distribution of goods comprises at least one transport conveyor mechanism, configured to receive, process and respond to the signal of the control electric link,

wherein the system of transportation and distribution of goods is configured to receive the control signals from the electronic unit for the control of warehousing department to move the goods from the warehousing department comprising at least one tool for the systematized storage of grouped goods to at least one electronic unit for serving the purchasers and also comprising the container with the packing elements for receiving the removed goods,

pursuant to the technical solution,

the sales and storage sector is divided by the partition into two separate compartments where the first compartment comprises at least one electronic unit for serving the purchasers

and the second compartment comprises at least one electronic unit for the control of the warehousing department, wherein

the system of transportation and distribution of goods is configured to respond to the control signal from the control unit for the control of storage room with regard to the way of movement of goods from the storage room as a result of the processing of the received control signal,

the second compartment has at least one conveyor transport intercompartmental coupling with the first compartment having a conveyor line consisting of at least two conveyors, a guide and a hole for the receipt of goods from the conveyor installed and located next to the guide, and

the conveyor transport intercompartmental coupling is configured to automatically move the goods selected by a purchaser from the second compartment to the first compartment and made in the form of through hole in the partition between the first and the second compartment,

the container with the packing element for receiving the removed goods from the system of transportation and distribution of goods is made in the form of the cell for goods comprising a hole for loading the goods and a hole for distributing the goods, having the doors with the means of automatic opening-closing,

wherein the said cell for goods is configured to provide access from the first compartment for the purchasers' receipt of goods on the one side of the cell and to provide access for loading the goods from the second compartment on the other side,

wherein the store window with samples of goods, at least one payment terminal and at least one fixed electronic digital scanner are located in the first compartment, and

wherein each item of goods has a unique code for reading by electronic digital device and electronic digital scanner, which is handheld and portable,

the payment terminal has a computer system with the software wherein the software contains the saved information about the availability and quantity of goods in the second compartment, and

wherein the computer system is configured to update the information about the availability and quantity of goods after each transaction; exchange the information with the

purchaser's personal electronic digital device comprising special downloaded software for the data exchange with the payment terminal; communicate information to the remote main electronic digital device for the self-service store network management, besides,

the payment terminal is coupled with the means of automatic opening-closing the cell for goods, with the conveyor line of the second compartment and with the guide, besides,

at least one means for the storage of goods located in the second compartment configured as a rack for goods which, in its turn, has a plurality of separate sections or conveyor with partitions for the separation of goods and for the storage of goods, and

the above-mentioned rack for goods comprises at least one sliding shelf located horizontally along the entire frontal part of the rack at an angle from  $0^{\circ}$  to  $30^{\circ}$ , and at least one sliding shelf is installed in the rack in such a way that its horizontal plane is located in the initial area of sections for the storage of goods, wherein

the conveyor line of the second compartment comprising at least two conveyors is configured in a so way that

- the first conveyor comprises the working moving surface for the transportation of goods, installed under the sliding shelf and the second conveyor comprises the working moving surface for the transportation of goods and this second conveyor is configured to transport goods received from the working moving surface of the first conveyor to the working surface of the second conveyor, and

- the second conveyor comprises the working moving surface configured to move at the level and along the hole for receiving the goods connected with the hole for loading the goods from the cell for goods, and

the guide installed with the hole for receiving goods wherein the guide is configured to move automatically in a gradual reverse manner and to take up the position at an angle to the hole for receiving goods and at the same time to project above the working moving surface of the second conveyor in order to direct the goods moving on the working surface of the second conveyor to the hole for receiving the goods, which in its turn is connected with the hole for loading the goods from the cell for goods.

According to an embodiment of the system, the payment terminal further comprises the body, display, technological and operational openings, information input devices, and

configured to carry out the operations regarding the selection and adjustment of selection of goods, operations to pay for the goods by cash, credit bank cards and electronic systems for the payment of goods, operations on the issue of fiscal receipts for purchasers,

fixed electronic digital scanner connected with the payment terminal for the data and information transmission by the fixed electronic digital scanner to the computer system of payment terminal and configured to read unique codes on goods and collect information about the goods selected by a purchaser, further transmitting this information to the computer system of payment terminal.

According to another embodiment of the system, the sales and storage sector is arranged as a container or van or concession stand or as a wagon.

Besides, in the system the sales and storage sector is divided by the vertical partition into two separate compartments, which are the first and the second compartments, respectively, wherein the first partition between the first and the second partitions is made in the form of a room partition wall.

According to the technical solution, the sales and storage sector is divided by the horizontal partition into two separate compartments – lower and upper floors, which are the first and the second compartments, respectively, wherein the horizontal partition between the first and the second compartments is arranged in the form of ceiling-floor, where it is a ceiling for the first compartment and a floor for the second compartment.

In another embodiment, in the through hole of the partition (ceiling-floor) between the first compartment (lower floor) and the second compartment (upper floor) there is a vertical tube element for moving the goods from the second compartment (upper floor) along its internal part to the first compartment (lower floor), wherein the upper hole of the tube element is the hole for receiving the goods from the working surface of the second conveyor in the second compartment and the hole for loading the goods from the cell for goods is coupled with the lower hole of the vertical tube element in the first compartment, besides, in the middle of the vertical tube element, on its inside walls, there are elastic restraints to hold and mitigate the falling of the goods from above to the hole for loading the goods from the cell for goods.

Besides, in still another embodiment of the system, the hole for receiving the goods from the working surface of the second conveyor in the second compartment is fitted with the basket.

Besides, in the through hole in the vertical partition between the first and the second compartment there is a cell for goods wherein at the same time its hole for loading the goods is functionally a hole for receiving the goods from the working surface of the second conveyor in the second compartment, and on the side of the hole for the handover of goods from the cell for goods there is an access thereto for purchasers from the first compartment.

According to another embodiment of the system, in the second compartment the hole for loading the goods from the cell for goods, which is also functionally a hole for receiving the goods from the working surface of the second conveyor, is arranged in the form of a basket.

According to another embodiment, the cell for goods contains a plurality of packing elements installed in the middle of the cell for goods with the possibility of automatic packing of each new item of goods or group of goods entering the cell for goods after their selection and payment made by the purchaser.

According to another embodiment of the technical solution, the conveyor line of the second compartment comprises the first conveyor arranged as a straight and belt one, and the second conveyor arranged as a rotary and belt one.

According to an embodiment of the solution, the angle of the guide in the position of capturing the goods from the working surface of the second conveyor is preferably  $45^\circ$  relative to central axis of the belt of the second conveyor.

According to another embodiment, the sliding shelf is located horizontally along the entire frontal part of the rack at an angle from  $30^\circ$  to  $45^\circ$ .

According to still another embodiment, the sliding shelf, which is a conveyor, is located horizontally along the entire frontal part of the rack at an angle from  $0^\circ$  inclusive.

Besides, the store window with samples of goods is arranged in the form of a set of actual goods or in the form of a touchscreen display with electronic digital image of goods and with the information about these goods or in the form of printed images of goods on any medium.

According to another embodiment, the store window with samples of goods comprises the electronic digital touchscreen menu configured to retrieve the information about the range

of goods and select or adjust the selection of the goods or their quantity by the purchaser of goods.

According to another embodiment of the system, the personal electronic digital device for reading unique codes of goods and collecting the information about the selection of goods is mobile phone or smartphone, or tablet computer or laptop having a special software installed, which is able to receive, identify, collect, correct and transmit the information about the selected goods to the software of the computer system of the payment terminal.

According to another embodiment of the system, the payment terminal is fitted with wired or wireless communication with all other structural elements of the self-service store, including with the mechanical guide of goods, with conveyors, with the guide, with the means for automatic opening-closing of the cell for goods and with the fixed electronic digital scanner, wherein, for the establishment of wireless communication, in the structural elements of the self-service store there are some sensors and/or controllers maintaining the standards of transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards.

That is, as a means of communication between the payment terminal and personal electronic digital device the standards of transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards are used.

According to another embodiment, the system comprises the system of locking entrance/exit doors to the sales and storage sector.

In addition, within the system, as a power supply source for structural elements of the store, the fixed power supply system or at least one autonomous power generator and at least one pneumatic compressor are used.

It was found that the claimed technical solution gained new properties. In particular, among the technical properties there is an enhancement of reliability of the system due to the presence of partitioned compartments. As a custom property, this prevents third parties from entering the warehouse. In terms of technical properties, the partition gains new properties, and is used as a means of decreasing the level of environmental impact on goods available in the warehouse, in particular, it concerns the temperature exposure, humidity. The partition



decreases the dust penetration into the moving elements of conveyors, reducing the need for their technical inspection and repair.

Besides, the claimed system thanks to its inherent features from the user's perspective enhances the convenience of the shopping process. Technically, the implementation of the sales process is ensured without intervention of people such as store staff, automating the operation of the claimed system.

In addition, from the user's standpoint, the expansion of the range of goods for sale is ensured. Technically, the system of conveyors is provided, moving the goods from the warehousing department to the customer service area, allowing for the combination of different types of goods at the same store, reducing the area of the store compared to the total area of several focused stores.

The following is a detailed description of the claimed solution, which is not limiting. The one skilled in the art will understand further improvements and updates on the said system based on this description within the scope of essence of the utility model. In the detailed description, other new technical properties apparent during the implementation of the claimed utility model will also be mentioned.

In the detailed description, the material objects known in the art will be used, the essence of which is clear for the one skilled in the art. However, the surprising technical properties are achievable by combining these material objects into a single system. That is, the whole system gains new properties, not its certain element.

The automated system for the self-service store is based on the autonomous premises divided by partition into two separate compartments. In different individual cases of invention, the autonomous sales and storage facility is arranged in the form of a container or van or concession stand or wagon but is not limited to them.

The autonomous facility of the store is connected to the power supply source. In different individual cases of invention, the fixed power supply system or at least one autonomous power generator is used as a power supply source for structural elements of the store.

In one of the embodiments, the fixed power supply system or at least one autonomous power generator is used as a power supply source for structural elements of the store.

The system comprises the sales and storage sector, connected to the power supply source, which can be autonomous or connected to exterior electric network. The sales and storage sector comprises at least one electronic unit for the customer service, at least one electronic unit for the management of the warehousing department, system of transportation and distribution of goods. The electronic unit for the customer service is arranged based on the electronic device for processing incoming requests coming through the interface and configured to search within the database and fulfil the request for adding an item of goods to the purchase list. In this embodiment, the electronic unit can duplicate functions of the store window. In each electronic unit for the management of the warehousing department, there is an inserted mechanical guide of goods installed in each section for the storage of goods and electronically coupled with the computer system of payment terminal.

The store window with samples of goods is arranged in the form of shelves, racks, guides or electronic interface. Any embodiment of the store window is intended for the dissemination of information about the availability of goods within the range of goods. In different individual cases of the store construction, the store window with samples of goods can be arranged in the form of a set of actual goods or in the form of touchscreen display with electronic digital image of goods and with the information about these goods or in the form of printed images of goods on any medium. In addition, the store window can comprise electronic digital touchscreen menu configured to familiarize with the information about the range of goods and select or adjust the selection of goods and their quantity by a purchaser. Each item of goods contains a unique code for reading by personal electronic digital device and fixed electronic digital scanner, which is handheld and portable.

Each computer system of the payment terminal comprises the body, a display, technological and operational openings, information input devices, a computer system and downloaded software. The payment terminal is configured to carry out operations on selecting and adjusting the selection of goods, payment transactions for the goods, operations on the issue of a fiscal receipt for the purchaser. In addition, the payment terminal is configured to carry out cash transactions, operations with credit cards and with electronic systems to pay for the goods. The software of the computer system of the payment terminal contains information about the availability and quantity of goods in the second compartment. Besides, this software

further allows for the information update regarding the availability and quantity of goods after each transaction; exchange of the information with a purchaser's personal electronic digital device containing a special downloaded software for the data exchange with the payment terminal; transmission of information to a remote electronic digital device for the self-service store network management.

The personal electronic digital device for reading unique codes of goods and collecting the information about the selection of goods is mobile phone, or smartphone, or tablet computer or laptop having an installed special software capable of receiving, identifying, collecting, correcting and transmitting the information about the selected goods to the software of the computer system of payment terminal. Such devices should have an installed special software (mobile application) capable of receiving, identifying, collecting, correcting and transmitting the information about the selected goods to the software of the computer system of payment terminal.

At least one fixed electronic digital scanner for scanning the goods selected by a purchaser is handheld and portable. The fixed electronic digital scanner has an established connection with the payment terminal and this connection enables the fixed electronic digital scanner to transmit the data and information to the computer system of payment terminal.

The fixed electronic digital scanner is configured to carry out the machine reading of unique codes about the goods and configured to collect the information about the goods selected by purchaser and configured to transmit this information to the computer system of payment terminal. The fixed electronic digital scanner is connected to the payment terminal for the transmission of data and information by the electronic digital scanner to the computer system of payment terminal, and configured to read unique codes of goods and to collect the information about the goods selected by a purchaser and to further transmit this information to the computer system of payment terminal. It enables the automation of data processing with regard to the sold goods and realized profit.

In addition, the payment terminal has an established connection with the means of automatic opening-closing of the cell for goods, with the conveyor line of the second compartment. Such connection can be wired or wireless. In this case, in order to establish the wireless connection, in the structural elements of the self-service store, the use is made of

sensors and/or controllers maintaining the standards of transmission of transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards. In case of wired connection, the data communications protocol for the local area network is used. The payment terminal has an installed wired or wireless connection with all other structural elements of the self-service store, including with the mechanical guide of goods, with conveyors, with the guide, with the means of automatic opening-closing of the cell for the goods and with the fixed electronic digital scanner where, for the establishment of wireless connection, in the structural elements of the self-service store, the sensors and/or controllers maintaining the standards of transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards are installed.

The payment terminal is connected to means of automatic opening-closing cell for goods, with the conveyor line of the second compartment and with the guide. As a means for communication between the payment terminal and personal electronic digital device, the use is made of the standards transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards.

The payment terminal further comprises the body, display, technological and operational openings, information input devices, and configured to carry out the operations regarding the selection and adjustment of selection of goods, operations to pay for the goods by cash, credit bank cards and electronic systems for the payment of goods, operations on the issue of fiscal receipts for purchasers. The cashless settlements are convenient from the user's perspective because they do not require a cashier. Technically, the cashless settlements automate the data sorting regarding the sold goods and realized profit. The payment terminal has a computer system with the software where the software contains saved information about the availability and quantity of goods in the second compartment.

The computer system is configured to update the information about the availability and quantity of goods after each transaction; exchange the information with the purchaser's electronic digital device containing a special downloaded software for the data exchange with

the payment terminal; communicate the information to the remote main electronic digital device for the self-service store network management. It enables the creation of automatic request for the addition of goods to the store. In some cases, a coefficient can be used, which is taken into consideration for the quantity of goods designated for the addition of goods to the store. For example, the coefficient takes into account the season for ordering season articles.

The system of transportation and distribution of goods comprises at least one transport conveyor mechanism, configured to receive, to process and to respond to the signal of the control electric link.

The system of transportation and distribution of goods is configured to receive the control signals from the electronic unit for the control of warehousing department to move the goods from the warehousing department comprising at least one device for the systematized storage of grouped goods to at least one electronic unit for serving the purchasers and also comprising the container with the packing elements for receiving the removed goods.

In this case, the system of transportation and distribution of goods comprises the container with the packing element for receiving the removed goods of the system of transportation and distribution of goods in the form of a cell for goods comprising the hole for loading the goods and hole for distributing the goods, having the doors with the means of automatic opening-closing. The number of cells for goods may vary, starting with one cell. Such cells for goods are set up in the self-service store in such a way that on the one side there is an access to each cell from the first compartment for purchasers' receiving the goods and on the other side there's an access hereto for loading the goods from the second compartment.

The sales and storage sector is divided by the partition into two separate compartments where the first compartment comprises at least one electronic unit for serving the purchasers and the second compartment comprises at least one electronic unit for the control of the warehousing department.

Moreover, according to one embodiment, the sales and storage sector is divided by the vertical partition into two separate compartments, which are the first and the second compartment, respectively, wherein the vertical partition between the first and the second compartments is made in the form of a room partition wall.

According to another embodiment, the sales and storage sector is divided by the horizontal partition into two separate compartments – lower and upper floors, which are the first and the second compartments, respectively, wherein the horizontal partition between the first and the second compartments are arranged in the form of ceiling-floor, where it is a ceiling for the first compartment and a floor for the second compartment.

The first compartment of the store is the customer service point, and the second compartment is the warehousing department with systemically arranged goods for sale and for the distribution of these goods to the purchasers in the first compartment through the system of transportation and distribution of goods.

In some cases of creation of the store, the autonomous sales and storage facility is divided by vertical partition into two separate compartments, which are the first and the second compartments, respectively, wherein the vertical partition between the first and the second compartments is made in the form of a room partition wall.

In other individual cases of creation of the store, the autonomous sales and storage facility is divided by horizontal partition into two separate compartments – lower and upper floors, which are the first and the second compartments, respectively, wherein the horizontal partition between the first and the second compartments is arranged in the form of a ceiling-floor, where it is a ceiling for the first compartment and a floor for the second compartment.

In the first compartment of the self-service store, there is a store window with samples of goods, at least one payment terminal and at least one fixed electronic digital scanner for scanning the goods selected by a purchaser.

The system of transportation and distribution of goods is configured to respond to the control signal received from the electronic unit for managing the warehousing facility by removing the goods from the warehousing department as a result of processing the control signal received.

As stated above, the sales and storage facility is made in the form of an autonomous facility divided by the partition into two separate compartments. And the partition can be vertical or horizontal, that is, the facility can be two-roomed or two-storeyed. Accordingly, the system of transportation and distribution of the store goods can have different additional

elements and components, which can be used for two-roomed and two-storeyed facility of the store.

In case of construction of the self-service store as a two-storeyed building (with the horizontal partition between the first and the second compartments) in the through hole of the partition (ceiling-floor) between the first compartment (lower floor) and the second compartment (upper floor), there is a vertical tube element for moving the goods within its interior part from the second compartment (upper floor) to the first compartment (lower floor). In this case, the upper hole of the vertical tube element is the hole for receiving the goods from the working surface of the second conveyor in the second compartment and the hole for loading the goods from the cell for goods is coupled with the lower hole of the vertical tube element in the first compartment. Besides, in the middle of the vertical tube element, on its inner walls, there are soft and elastic restraints to hold and mitigate the falling of the goods from above to the hole for loading the goods from the cell for goods. In this case, the hole for receiving the goods from the working surface of the second conveyor in the second compartment can be made in the form of a basket.

In case of construction of the self-service store (with the vertical partition between the first and the second compartments) in the through hole in the vertical partition between the first and the second compartment there is a cell for goods installed in such a way that at the same time, functionally, its hole for loading the goods is a hole for receiving the goods from the working surface of the second conveyor in the second compartment, and on the side of the hole for the delivery of goods, there is an access hereto for the purchasers from the first compartment. Besides, in this case of construction of the store premises, the hole for loading the goods from the cell for goods, which is functionally also a hole for receiving the goods from the working surface of the second conveyor, is made in the form of a basket.

The second compartment has at least one conveyor transport intercompartmental coupling with the first compartment, having a conveyor line consisting of at least two conveyors, a guide and a hole for the receipt of goods from the conveyor installed and located next to the guide.

The second compartment (warehousing department) of the store comprises at least one unit for the storage of various goods with sections for goods, where the goods are systemically

grouped and located. This unit for the storage of goods located in the second compartment is configured as a rack for goods, which, in its turn, has a plurality of separate sections for the storage of goods. The number of racks for the goods may be different (more than one). In each section for the goods in each rack there is a mechanical guide of goods (e.g. solenoid but not limited to that), having an established connection with the computer system of payment terminal.

Besides, the second compartment (warehousing department) has at least one conveyor transport intercompartmental coupling with the first compartment, having a conveyor line consisting of at least two conveyors, a guide and a hole for the receipt of goods from the conveyor installed and located next to the guide of goods. This conveyor transport intercompartmental coupling is meant for the automatic transportation (delivery) of goods selected by a purchaser from the second compartment to the first compartment. The direct intercompartmental coupling is arranged in the form of a through hole in the partition between the first and the second compartment.

In the second compartment, the hole for loading the goods from the cell for goods, which is also functionally a hole for receiving the goods from the working surface of the second conveyor, is made in the form of a basket.

The conveyor transport intercompartmental coupling is configured to automatically move the goods selected by a purchaser from the second compartment to the first compartment and made in the form of a through hole in the partition between the first and the second compartment.

The container with the packing element for receiving the removed goods from the system of transportation and distribution of goods made in the form of a cell for goods comprising a hole for loading the goods and a hole for the delivery of the goods having the doors with the means of automatic opening-closing.

Moreover, the cell for goods is configured to grant access from the first compartment for the purchasers' receipt of the goods from one side of the cell and to grant access for loading the goods from the second compartment from the other side.

In some cases of construction of the store, the cell for goods can comprise a plurality of packing elements inside the cell for goods configured to pack automatically each new item of



goods or a group of goods entering the cell for goods after their selection and payment by a purchaser.

The cell for goods comprises a plurality of packing elements inside the cell for goods configured to pack automatically each new item of goods or a group of goods entering the cell for goods after their selection and payment by a purchaser.

At least one means for the storage of goods is located in the second compartment made in the form of a rack for goods, which, in its turn, contains a plurality of separate sections for the storage of goods on the fixed surface or on the conveyor.

The aforementioned rack for goods comprises at least one sliding shelf located horizontally along the entire frontal part of the rack at an angle of no less than  $30^\circ$  or a shelf in the form of a conveyor at an angle from  $0^\circ$  inclusive, and at least one sliding shelf is installed in the rack in such a way that its horizontal plane is located in the initial area of sections for the storage of goods.

Preferably, each rack for the goods comprises at least one sliding shelf located horizontally along the entire frontal part of the rack at an angle from  $30^\circ$  to  $45^\circ$  or a shelf in the form of a conveyor at an angle from  $0^\circ$  inclusive. This angle allows for free sliding of the goods to the conveyor.

The conveyor line of the second compartment comprises at least two conveyors: the first conveyor arranged as a straight and belt one, and the second conveyor arranged as a rotary and belt one.

The first conveyor comprises the working moving surface for the transportation of goods, installed under the sliding shelf. The first conveyor comprises the moving working surface and it is installed in such a way that its working moving surface is located under the sliding shelf and the second conveyor also comprises the working moving surface for the transportation of goods and this second conveyor is arranged in such a way that during the operation of the first and the second conveyor the goods transported by the first conveyor penetrate from the working surface of the first conveyor to the working surface of the second conveyor.

The first conveyor comprises a working moving surface for the transportation of goods and this second conveyor is configured to transport the goods received from the working moving surface of the first conveyor to the working surface of the second conveyor.

The second conveyor is located in the second compartment (storage facility) in such a way that during the operation its working moving surface is moving at the level and along the hole for receiving the goods, which, in its turn, is coupled with the hole for loading the goods from the cell for goods. Next to the hole for receiving the goods from the second conveyor, there is a guide for goods configured to open (move) automatically and to take up a position at an angle to the hole for receiving the goods and at the same time to project above the working moving surface of the second conveyor in order to direct (distribute) the goods moving on the working surface of the second conveyor to the hole for receiving the goods, which, in its turn, is connected with the hole for loading the goods from the cell for goods.

The second conveyor comprises the working moving surface configured to move at the level and along the hole for receiving the goods connected with the hole for loading the goods from the cell for goods.

The angle of the guide in the position of capturing the goods from the working surface of the second conveyor is preferably  $45^\circ$  relative to central axis of the belt of the second conveyor.

The first conveyor can be arranged straight and belt one, and the second conveyor can be arranged as a rotary and belt one.

The guide installed with the hole for receiving goods wherein the guide is configured to move automatically in a gradual reverse manner and to take up the position at an angle to the hole for receiving goods and at the same time to project above the working moving surface of the second conveyor in order to direct the goods moving on the working surface of the second conveyor to the hole for receiving the goods, which in its turn is connected with the hole for loading the goods from the cell for goods.

In the through hole of the partition (ceiling-floor) between the first compartment (lower floor) and the second compartment (upper floor) there is a vertical tube element for moving the goods from the second compartment (upper floor) along its internal part to the first compartment (lower floor), wherein the upper hole of the tube element is the hole for receiving

the goods from the working surface of the second conveyor in the second compartment and the hole for loading the goods from the cell for goods is coupled with the lower hole of the vertical tube element in the first compartment, besides, in the middle of the vertical tube element, on its inside walls, there are elastic restraints to hold and mitigate the falling of the goods from above to the hole for loading the goods from the cell for goods.

According to one embodiment, the hole for receiving the goods from the working surface of the second conveyor in the second compartment is fitted with the basket.

In the through hole in the vertical partition between the first and the second compartment, there is a cell for goods wherein its hole for loading the goods is also functionally a hole for receiving the goods from the working surface of the second conveyor in the second compartment, and on the side of the hole for the handover of goods from the cell for goods there is an access thereto for purchasers from the first compartment.

The system further comprises the system of locking entrance/exit doors to the sales and storage sector for the prevention of unauthorized access to the storage sector. In case of presence of the system of locking entrance/exit doors to the autonomous sales and storage sector in the store facilities, such system activates automatically under certain force majeure circumstances. For example, during the attempt to damage the store by any people or other similar acts.

The system comprises an alarm system. The system activates mainly in case of smoke condition or in case of the store's structural integrity damage.

Thus, the claimed objective is realized and new defined technical properties are achieved.

## CLAIMS

1. The automated system for self-service store comprising:

- sales and storage sector, which is connected to the power supply source and which includes at least one electronic unit for the control of the warehousing department, system of transportation and distribution of goods,

- store window with samples of goods,

- at least one computer system of payment terminal,

- at least one fixed electronic digital scanner for scanning the good selected by a purchaser, wherein

- each electronic unit for the control of the warehousing department comprises the mechanical pusher of goods, installed in each section for the storage of goods and coupled to the computer system of the payment terminal,

- payment terminal,

besides, the system of transportation and distribution of goods comprises at least one transport conveyor mechanism, configured to receive, process and respond to the signal of the control electric link,

wherein the system of transportation and distribution of goods is configured to receive the control signals from the electronic unit for the control of warehousing department to move the goods from the warehousing department comprising at least one tool for the systematized storage of grouped goods to at least one electronic unit for serving the purchasers and also comprising the container with the packing elements for receiving the removed goods,

### **wherein**

the sales and storage sector is divided by the partition into two separate compartments where the first compartment comprises at least one electronic unit for serving the purchasers and the second compartment comprises at least one electronic unit for the control of the warehousing department, wherein

the system of transportation and distribution of goods is configured to respond to the control signal from the control unit for the control of storage room with regard to the

way of movement of goods from the storage room as a result of the processing of the received control signal,

the second compartment has at least one conveyor transport intercompartmental coupling with the first compartment having a conveyor line consisting of at least two conveyors, a guide and a hole for the receipt of goods from the conveyor installed and located next to the guide, and

the conveyor transport intercompartmental coupling is configured to automatically move the goods selected by the purchaser from the second compartment to the first compartment and made in the form of through hole in the partition between the first and the second compartment,

the container with the packing element for receiving the removed goods from the system of transportation and distribution of goods is made in the form of the cell for goods comprising a hole for loading the goods and a hole for distributing the goods, having the doors with the means of automatic opening-closing,

wherein the said cell for goods is configured to provide access from the first compartment for the purchasers' receipt of goods on the one side of the cell and to provide access for loading the goods from the second compartment on the other side,

where store window with samples of goods, at least one payment terminal and at least one fixed electronic digital scanner are located in the first compartment, and

where each item of goods has a unique code for reading by electronic digital device and electronic digital scanner which is handheld and portable,

the payment terminal has a computer system with the software wherein the software contains the saved information about the availability and quantity of goods in the second compartment, and

wherein the computer system is configured to update the information about the availability and quantity of goods after each transaction; exchange the information with the purchaser's personal electronic digital device comprising special downloaded software for the data exchange with the payment terminal; communicate information to the remote main electronic digital device for the self-service store network management, besides,

the payment terminal is coupled with the means of automatic opening-closing the cell for goods, with the conveyor line of the second compartment and with the guide, besides,

at least one means for the storage of goods located in the second compartment configured as a rack for goods which, in its turn, has a plurality of separate sections for the storage of goods, and

the above-mentioned rack for goods comprises at least one sliding shelf or a shelf in the form of a conveyor located horizontally along the entire frontal part of the rack at an angle from  $0^\circ$  to  $30^\circ$ , and at least one sliding shelf is installed in the rack in such a way that its horizontal plane is located in the initial area of sections for the storage of goods, wherein

the conveyor line of the second compartment comprising at least two conveyors is configured in a so way that

- the first conveyor comprises the working moving surface for the transportation of goods, installed under the sliding shelf and the second conveyor comprises the working moving surface for the transportation of goods and this second conveyor is configured to transport goods received from the working moving surface of the first conveyor to the working surface of the second conveyor, and

- the second conveyor comprises the working moving surface configured to move at the level and along the hole for receiving the goods connected with the hole for loading the goods from the cell for goods, and

the guide installed with the hole for receiving goods wherein the guide is configured to move automatically in a gradual reverse manner and to take up the position at an angle to the hole for receiving goods and at the same time to project above the working moving surface of the second conveyor in order to direct the goods moving on the working surface of the second conveyor to the hole for receiving the goods, which in its turn is connected with the hole for loading the goods from the cell for goods.

2. The system according to claim 1, wherein

the payment terminal further comprises the body, display, technological and operational openings, information input devices, and configured to carry out the operations regarding the selection and adjustment of selection of goods, operations to pay for the goods by cash, credit

bank cards and electronic systems for the payment of goods, operations on the issue of fiscal receipts for purchasers,

fixed electronic digital scanner connected with the payment terminal for the data and information transmission by the fixed electronic digital scanner to the computer system of payment terminal and configured to read unique codes on goods and collect information about the goods selected by the purchaser, further transmitting this information to the computer system of payment terminal.

3. The system according to claim 1 and 2, wherein the sales and storage sector is arranged as a container or van or concession stand or as a wagon.

4. The system according to any one of the preceding claims, wherein the sales and storage sector is divided by the vertical partition into two separate compartments, which are the first and the second compartments, respectively, wherein the first partition between the first and the second partitions is made in the form of a room partition wall.

5. The system according to any one of the preceding claims, wherein the the sales and storage sector is divided by the horizontal partition into two separate compartments – lower and upper floors, which are the first and the second compartments, respectively, wherein the horizontal partition between the first and the second compartments is arranged in the form of ceiling-floor, where it is a ceiling for the first compartment and a floor for the second compartment.

6. The system according to claims 1-2 or according to claim 5, wherein in the through hole of the partition (ceiling-floor) between the first compartment (lower floor) and the second compartment (upper floor) there is a vertical tube element for moving the goods from the second compartment (upper floor) along its internal part to the first compartment (lower floor), wherein the upper hole of the tube element is the hole for receiving the goods from the working surface of the second conveyor in the second compartment and the hole for loading the goods from the cell for goods is coupled with the lower hole of the vertical tube element in the first compartment, besides, in the middle of the vertical tube element, on its inside walls, there are elastic restraints to hold and mitigate the falling of the goods from above to the hole for loading the goods from the cell for goods.

7. The system according to claims 1-2 or according to claim 6 wherein the hole for receiving the goods from the working surface of the second conveyor in the second compartment is fitted with the basket.

8. The system according to claims 1-2 or according to claim 4, wherein, in the through hole in the vertical partition between the first and the second compartment there is a cell for goods wherein at the same time its hole for loading the goods is functionally a hole for receiving the goods from the working surface of the second conveyor in the second compartment, and on the side of the hole for the handover of goods from the cell for goods there is an access thereto for purchasers from the first compartment.

9. The system according to claims 1-2 or according to claim 8, wherein in the second compartment the hole for loading the goods from the cell for goods, which is also functionally a hole for receiving the goods from the working surface of the second conveyor, is arranged in the form of a basket.

10. The system according to any one of the preceding claims, wherein the cell for goods contains a plurality of packing elements installed in the middle of the cell for goods with the possibility of automatic packing of each new item of goods or group of goods entering the cell for goods after their selection and payment made by the purchaser.

11. The system according to any one of the preceding claims, wherein the conveyor line of the second compartment comprises the first conveyor arranged as a straight and belt one, and the second conveyor arranged as a rotary and belt one.

12. The system according to any one of the preceding claims, wherein the angle of the guide in the position of capturing the goods from the working surface of the second conveyor is preferably from  $0^{\circ}$  to  $45^{\circ}$  relative to central axis of the belt of the second conveyor.

13. The system according to any one of the preceding claims, the sliding shelf is located horizontally along the entire frontal part of the rack at an angle from  $0^{\circ}$  to  $45^{\circ}$ .

14. The system according to any one of the preceding claims, wherein the store window with samples of goods is arranged in the form of a set of actual goods or in the form of a touchscreen display with electronic digital image of goods and with the information about these goods or in the form of printed images of goods on any medium.



15. The system according to any one of the preceding claims, wherein the store window with samples of goods comprises the electronic digital touchscreen menu configured to retrieve the information about the range of goods and select or adjust the selection of the goods or their quantity by the purchaser of goods.

16. The system according to any one of the preceding claims, wherein the personal electronic digital device for reading unique codes of goods and collecting the information about the selection of goods is mobile phone or smartphone, or tablet computer or laptop having a special software installed, which is able to receive, identify, collect, correct and transmit the information about the selected goods to the software of the computer system of the payment terminal.

17. The system according to any one of the preceding claims, wherein the payment terminal is fitted with wired or wireless communication with all other structural elements of the self-service store, including with the mechanical pusher of goods, with conveyors, with the guide, with the means for automatic opening-closing of the cell for goods and with the fixed electronic digital scanner, wherein, for the establishment of wireless communication, in the structural elements of the self-service store there are some sensors and/or controllers maintaining the standards of transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards.

18. The system according to claims 1-2 or according to claim 15, wherein as a means of communication between the payment terminal and personal electronic digital device the standards of transmission of the Wi Fi data flow and/or Bluetooth wireless communications technology standards and/or NFC short-range wireless data transmission technology standards are used.

19. The system according to any one of the preceding claims, wherein the system comprises the system of locking entrance/exit doors to the sales and storage sector.

20. The system according to any one of the preceding claims, wherein the system comprises the alarm system.

21. The system comprising the sales and storage sector wherein the fixed power supply system or at least one autonomous power generator is used as a power supply source for structural elements of the store.

INTERNATIONAL SEARCH REPORT

International application No  
PCT/UA2019/000097

A. CLASSIFICATION OF SUBJECT MATTER  
INV. G06Q30/06 B65G1/137 G06Q30/02  
ADD.  
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED  
Minimum documentation searched (classification system followed by classification symbols)  
G06Q B65G  
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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X	US 2018/068368 A1 (MATTINGLY TODD D [US] ET AL) 8 March 2018 (2018-03-08) cited in the application abstract paragraph [0011] - paragraph [0052] figures 1-5	1-21
X	US 2009/149985 A1 (CHIRNOMAS MUNROE [US]) 11 June 2009 (2009-06-11) abstract paragraph [0010] - paragraph [0157] figures 6,8,10	1-21
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Further documents are listed in the continuation of Box C.  See patent family annex.

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search <b>29 November 2019</b>	Date of mailing of the international search report <b>10/12/2019</b>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <b>Peelen, Bastien</b>
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International application No  
PCT/UA2019/000097

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