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Wu et al.

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(54) **ELECTRONIC SHELF LABEL CONTROLLING SYSTEM, ELECTRONIC SHELF LABEL INSTALLING METHOD AND ELECTRONIC SHELF LABEL UPDATING METHOD**

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G06Q 30/02 (2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 30/0241*** (2013.01); ***G06F 3/147*** (2013.01); *G09G 2360/04* (2013.01); *G09G 2370/022* (2013.01); *G09G 2370/16* (2013.01); *G09G 2380/04* (2013.01)

(58) **Field of Classification Search**
CPC G09G 2380/04; G09G 2370/16; G06Q 10/087; G06Q 30/0241; G06F 3/147
See application file for complete search history.

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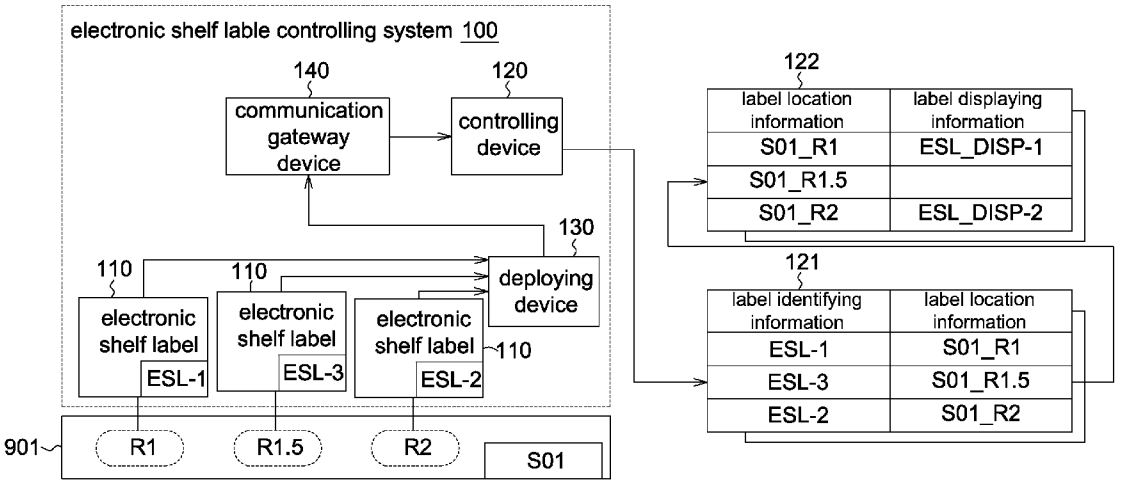
(57) **ABSTRACT**

An electronic shelf label controlling system, an electronic shelf label installing method and an electronic shelf label updating method are provided. The electronic shelf label controlling system of the electronic shelf label includes at least an electronic shelf label, a controlling device, a deploying device, and a communication gateway device. The electronic shelf label is disposed on a shelf. The controlling device stores a label location table. The label location table records a relationship between a label identifying information and a label location information of the electronic shelf label. The deploying device is used for obtaining the label identifying information. The communication gateway device is used for communicating the controlling device, the deploying device and the electronic shelf label.

12 Claims, 14 Drawing Sheets



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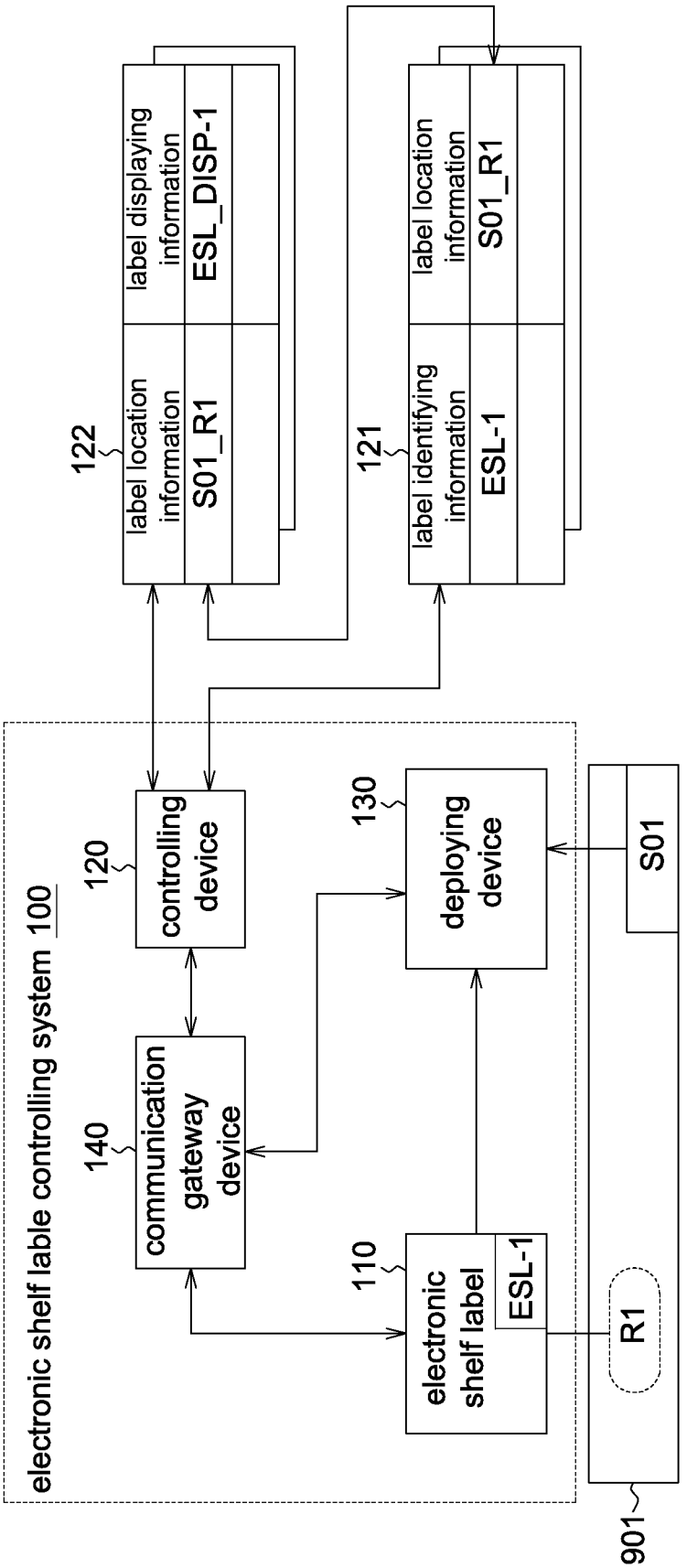
electronic shelf lable controlling system 100
120
controlling device
140
communication gateway device
110
electronic shelf label
ESL-1
130
deploying device
122
label location information
S01_R1
label displaying information
ESL_DISP-1
121
label identifying information
ESL-1
label location information
S01_R1
S01
R1
901

FIG. 1

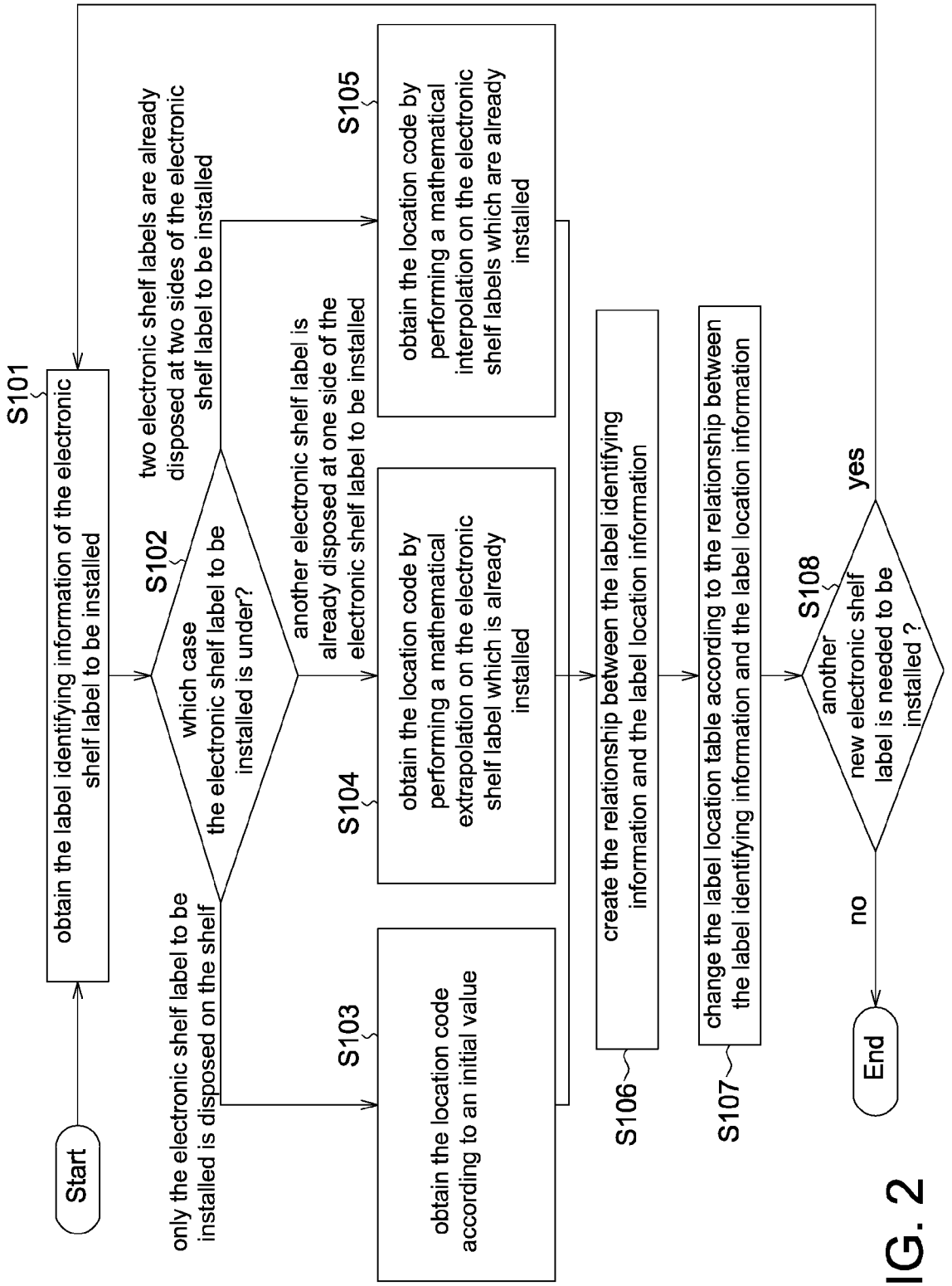
Start
S101
obtain the label identifying information of the electronic shelf label to be installed
S102
which case the electronic shelf label to be installed is under?
only the electronic shelf label to be installed is disposed on the shelf
two electronic shelf labels are already disposed at two sides of the electronic shelf label to be installed
another electronic shelf label is already disposed at one side of the electronic shelf label to be installed
S103
obtain the location code according to an initial value
S104
obtain the location code by performing a mathematical extrapolation on the electronic shelf label which is already installed
S105
obtain the location code by performing a mathematical interpolation on the electronic shelf labels which are already installed
S106
create the relationship between the label identifying information and the label location information
S107
change the label location table according to the relationship between the label identifying information and the label location information
S108
another new electronic shelf label is needed to be installed ?
yes
no
End

FIG. 2

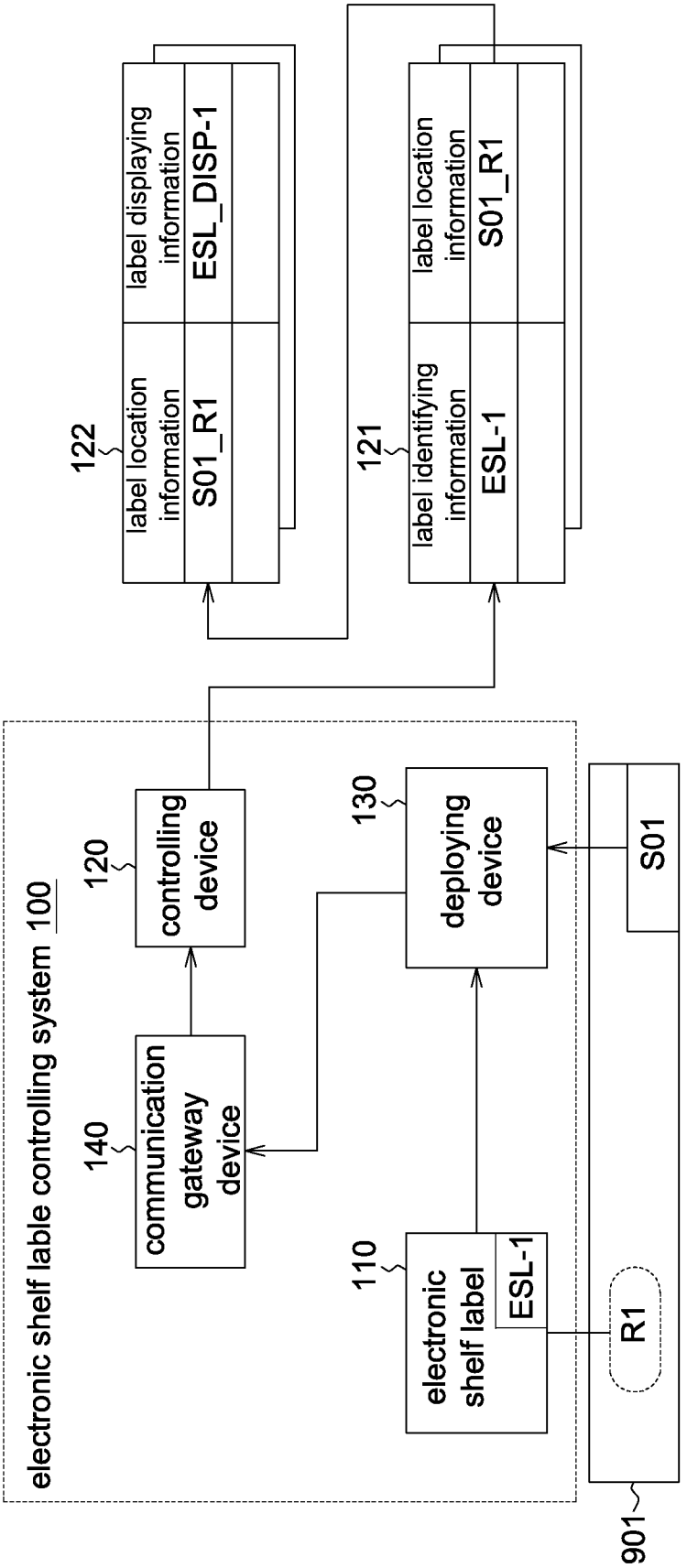
electronic shelf lable controlling system 100
120
controlling device
140
communication gateway device
130
deploying device
110
electronic shelf label
ESL-1
R1
S01
901
122
label location information
S01_R1
label displaying information
ESL_DISP-1
121
label identifying information
ESL-1
label location information
S01_R1

FIG. 3A

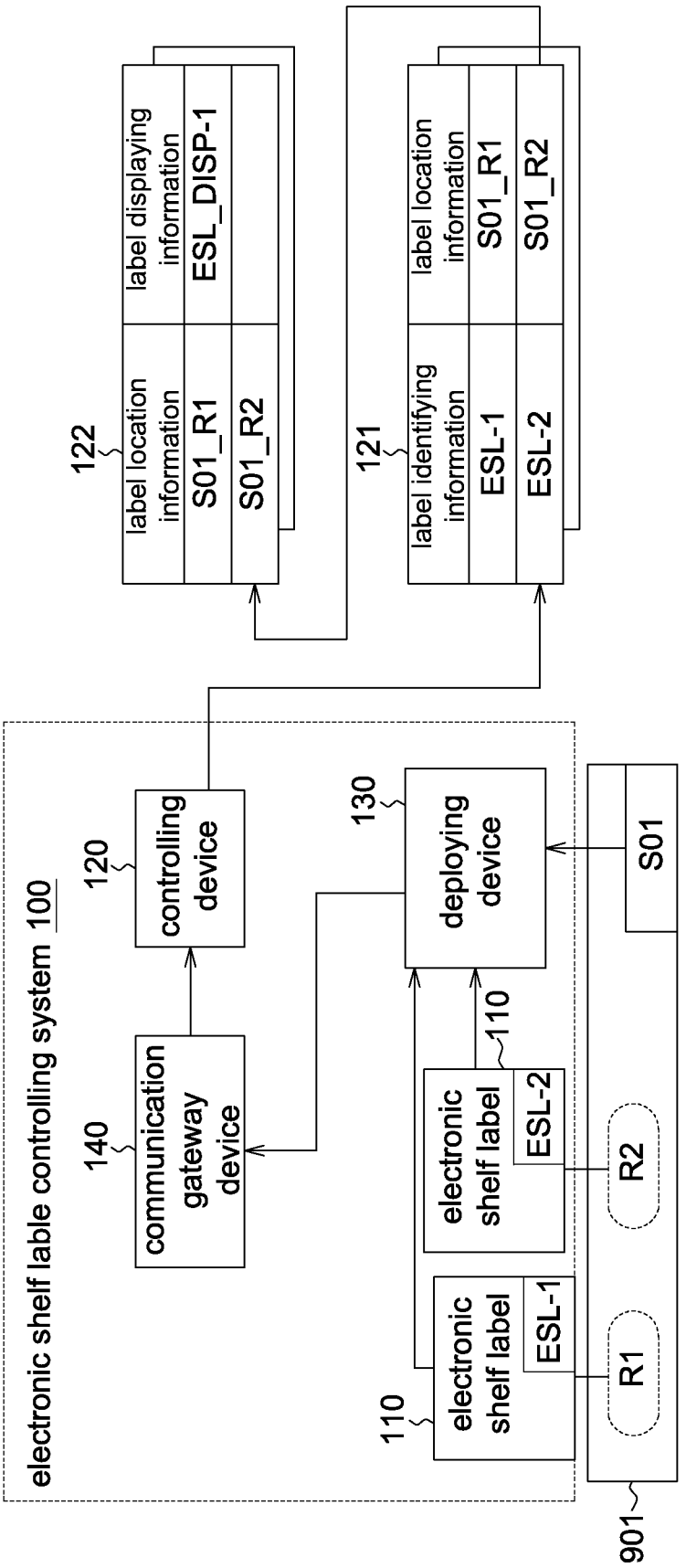
electronic shelf lable controlling system 100
120
controlling device
140
communication gateway device
130
deploying device
110
electronic shelf label
ESL-1
110
electronic shelf label
ESL-2
R1
R2
S01
901
122
label location information
S01_R1
S01_R2
label displaying information
ESL_DISP-1
121
label identifying information
ESL-1
ESL-2
label location information
S01_R1
S01_R2

FIG. 3B

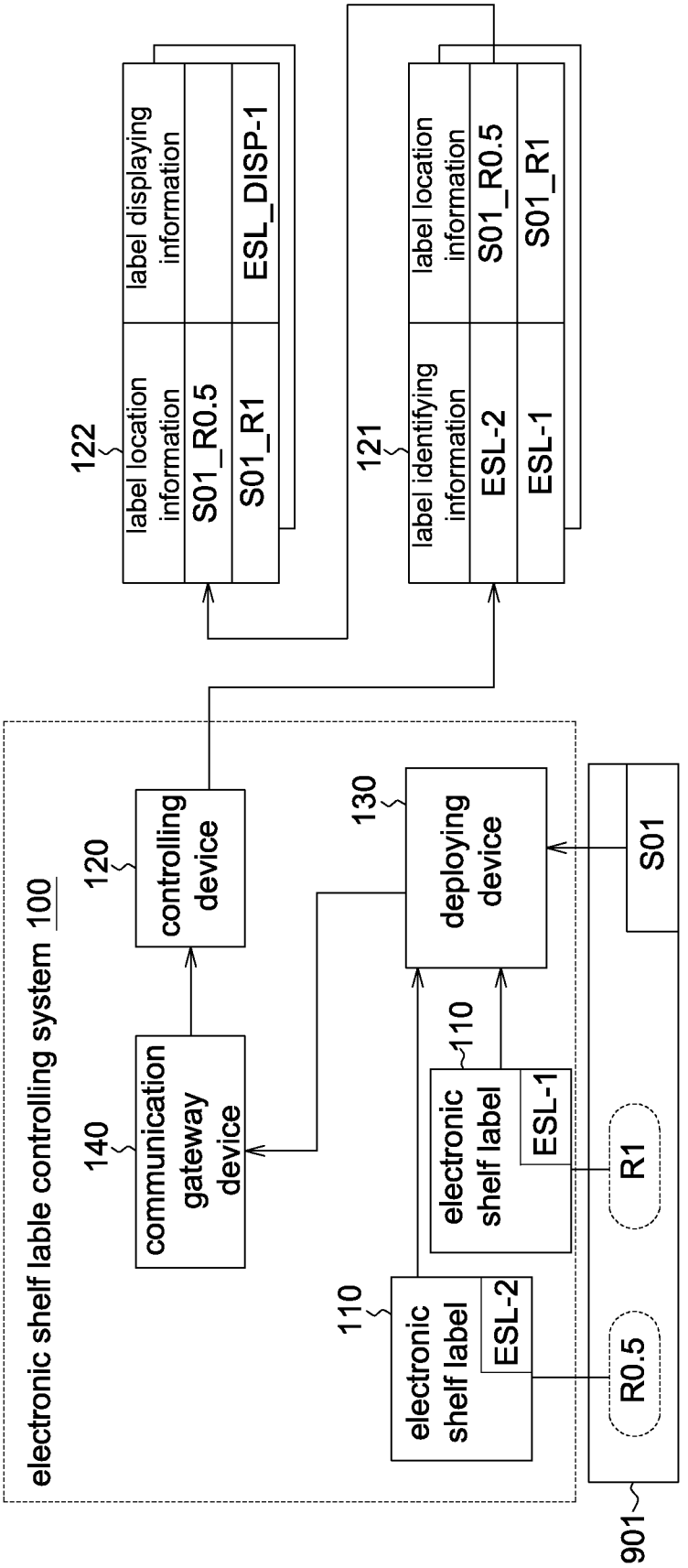
electronic shelf lable controlling system 100
120
controlling device
140
communication gateway device
130
deploying device
110
electronic shelf label
ESL-1
110
electronic shelf label
ESL-2
R0.5
R1
S01
901
122
label location information
label displaying information
S01_R0.5
S01_R1
ESL_DISP-1
121
label identifying information
label location information
ESL-2
ESL-1
S01_R0.5
S01_R1

FIG. 3C

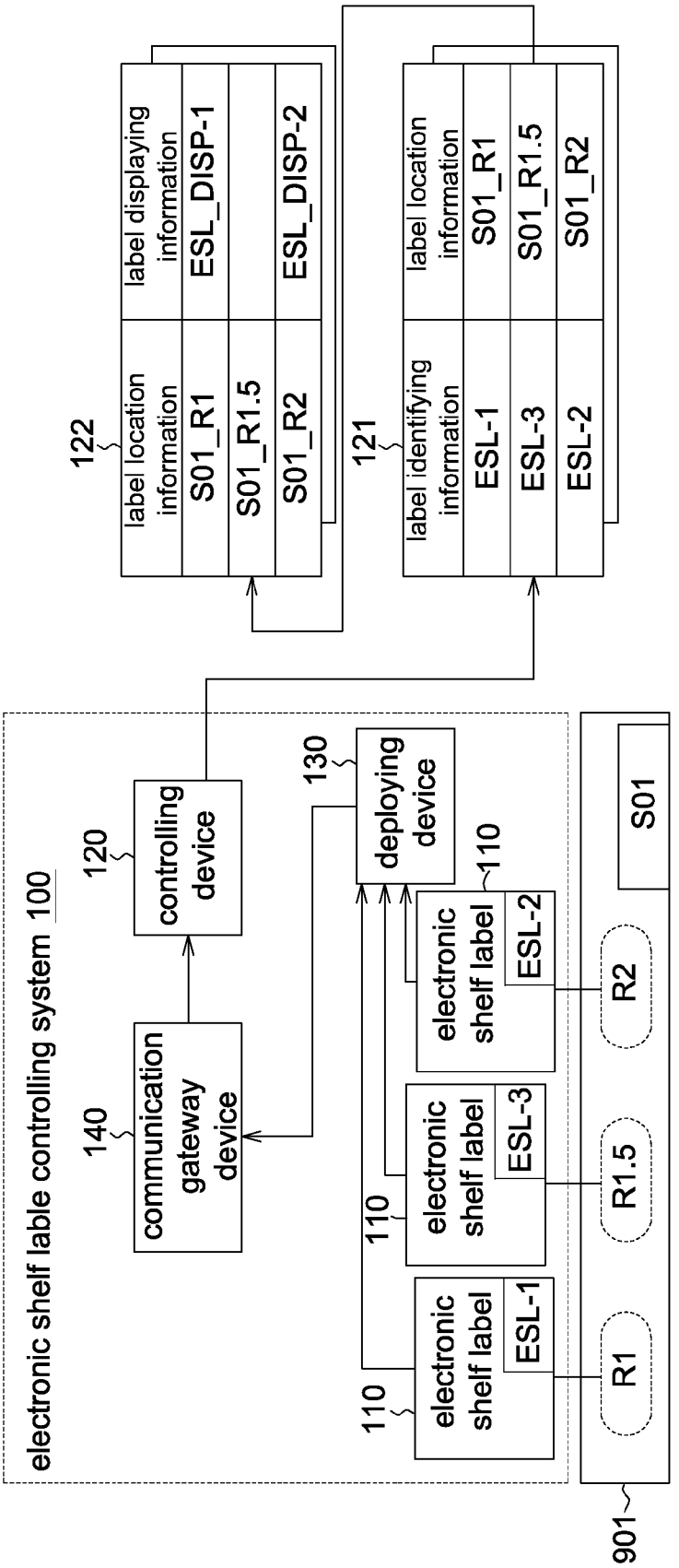
electronic shelf lable controlling system 100
140
communication gateway device
120
controlling device
130
deploying device
110
electronic shelf label
ESL-1
110
electronic shelf label
ESL-3
110
electronic shelf label
ESL-2
R1
R1.5
R2
S01
901
122
label location information
S01_R1
S01_R1.5
S01_R2
label displaying information
ESL_DISP-1
ESL_DISP-2
121
label identifying information
ESL-1
ESL-3
ESL-2
label location information
S01_R1
S01_R1.5
S01_R2

FIG. 3D

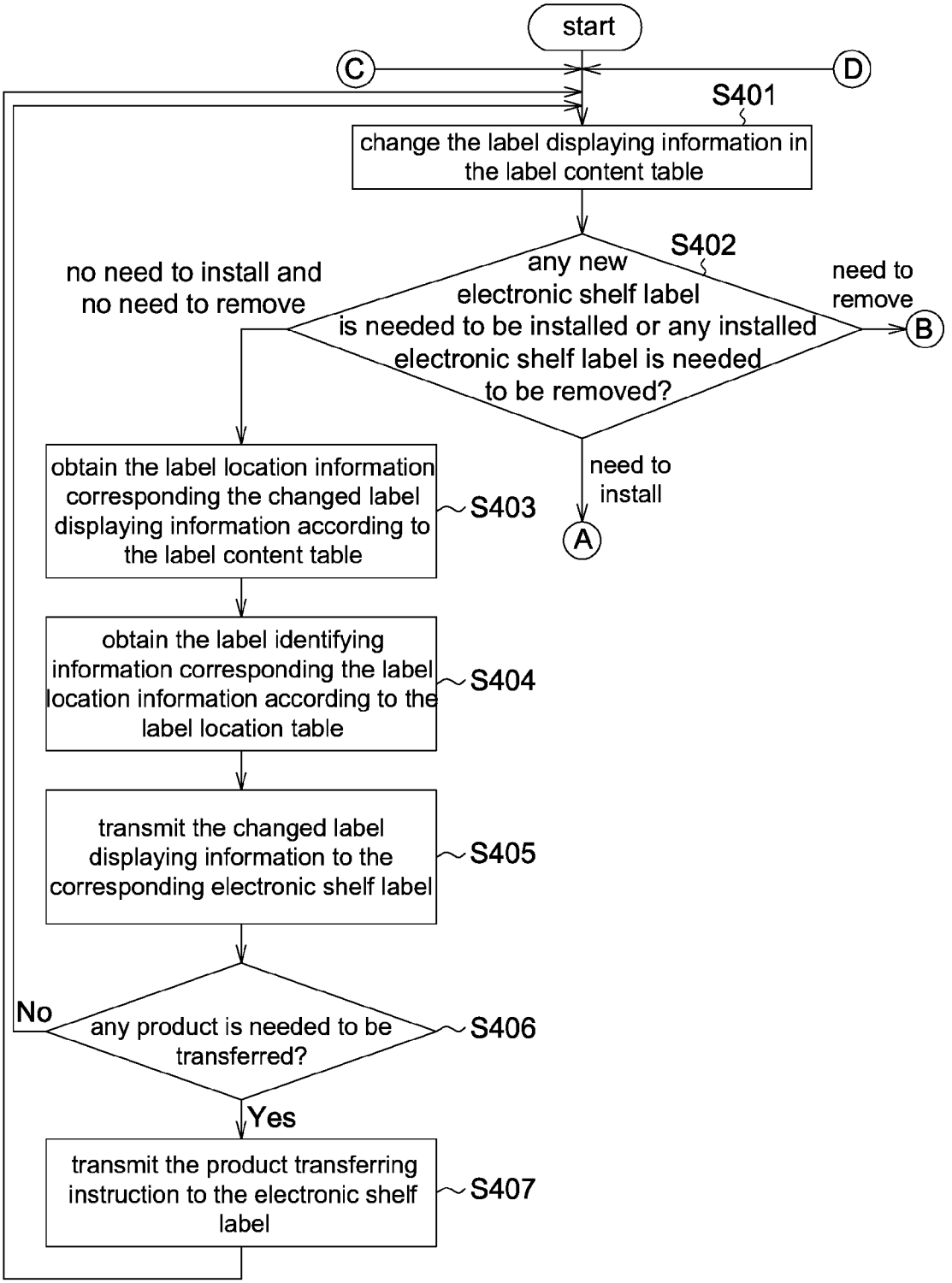
start
C
D
S401
change the label displaying information in the label content table
S402
any new electronic shelf label is needed to be installed or any installed electronic shelf label is needed to be removed?
no need to install and no need to remove
need to remove
B
need to install
A
obtain the label location information corresponding the changed label displaying information according to the label content table
S403
obtain the label identifying information corresponding the label location information according to the label location table
S404
transmit the changed label displaying information to the corresponding electronic shelf label
S405
any product is needed to be transferred?
S406
No
Yes
transmit the product transferring instruction to the electronic shelf label
S407

FIG. 4A

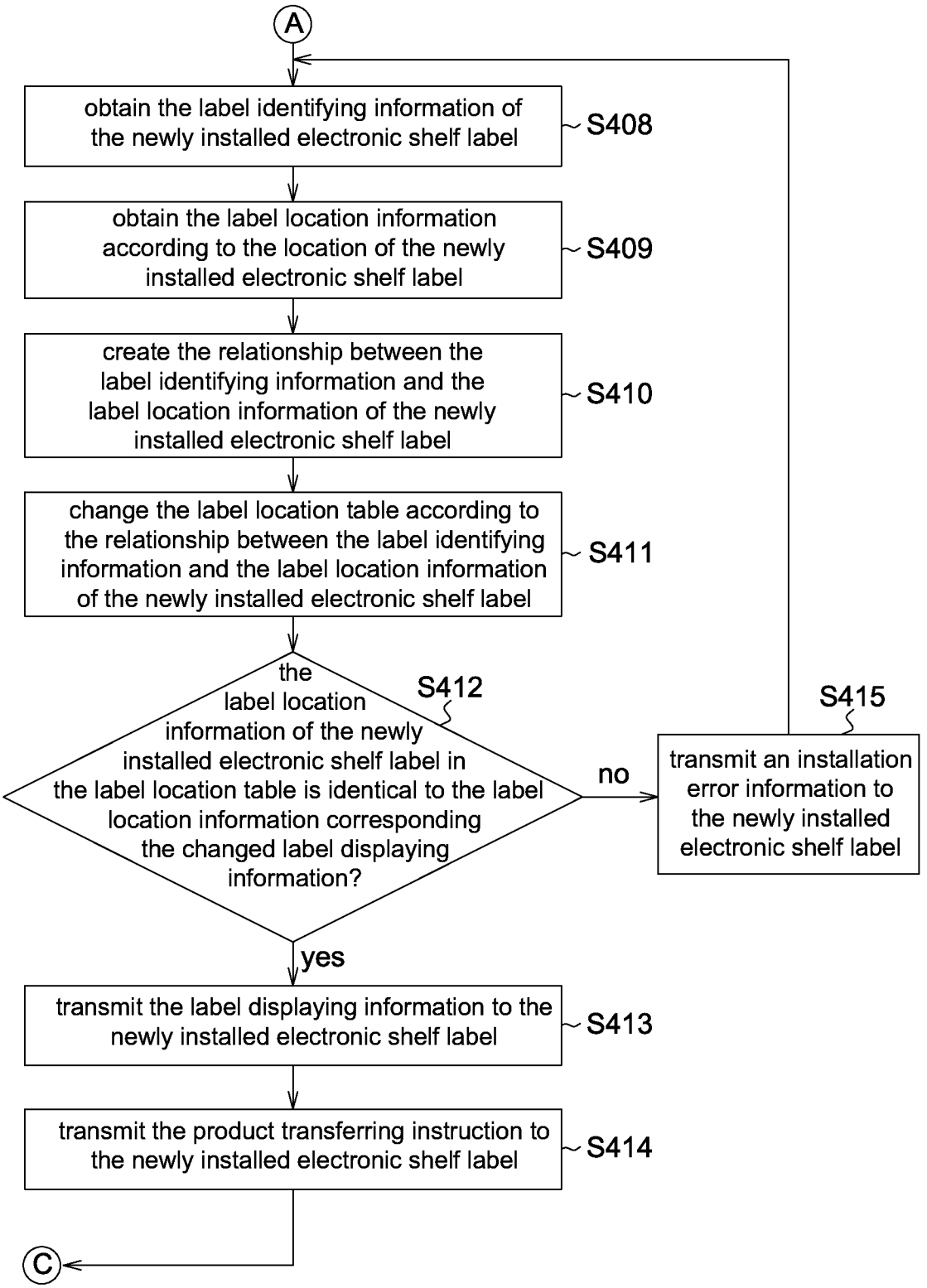
A
obtain the label identifying information of the newly installed electronic shelf label
S408
obtain the label location information according to the location of the newly installed electronic shelf label
S409
create the relationship between the label identifying information and the label location information of the newly installed electronic shelf label
S410
change the label location table according to the relationship between the label identifying information and the label location information of the newly installed electronic shelf label
S411
S412
the label location information of the newly installed electronic shelf label in the label location table is identical to the label location information corresponding the changed label displaying information?
no
S415
transmit an installation error information to the newly installed electronic shelf label
yes
transmit the label displaying information to the newly installed electronic shelf label
S413
transmit the product transferring instruction to the newly installed electronic shelf label
S414
C

FIG. 4B

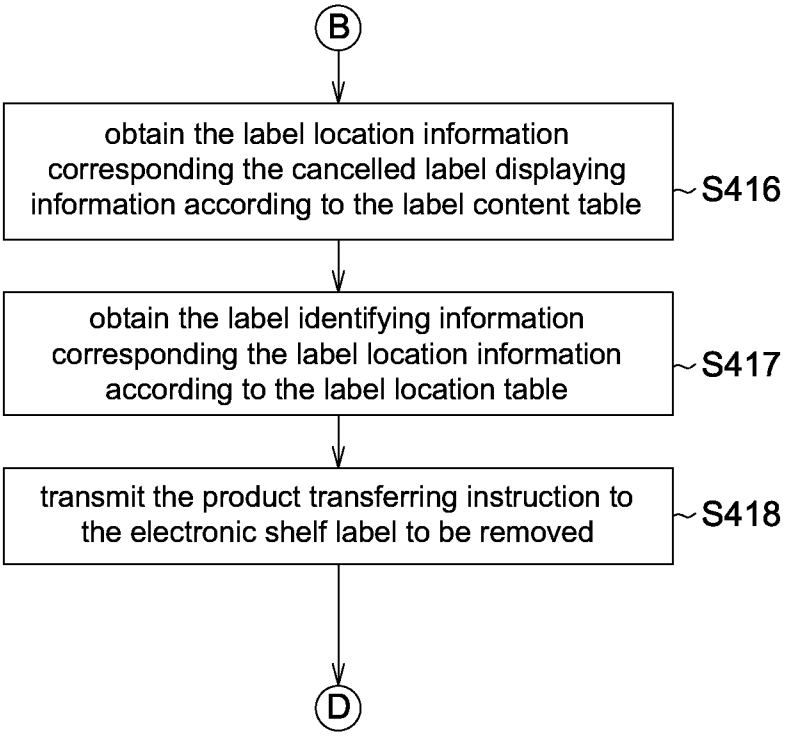
B
obtain the label location information corresponding the cancelled label displaying information according to the label content table
S416
obtain the label identifying information corresponding the label location information according to the label location table
S417
transmit the product transferring instruction to the electronic shelf label to be removed
S418
D

FIG. 4C

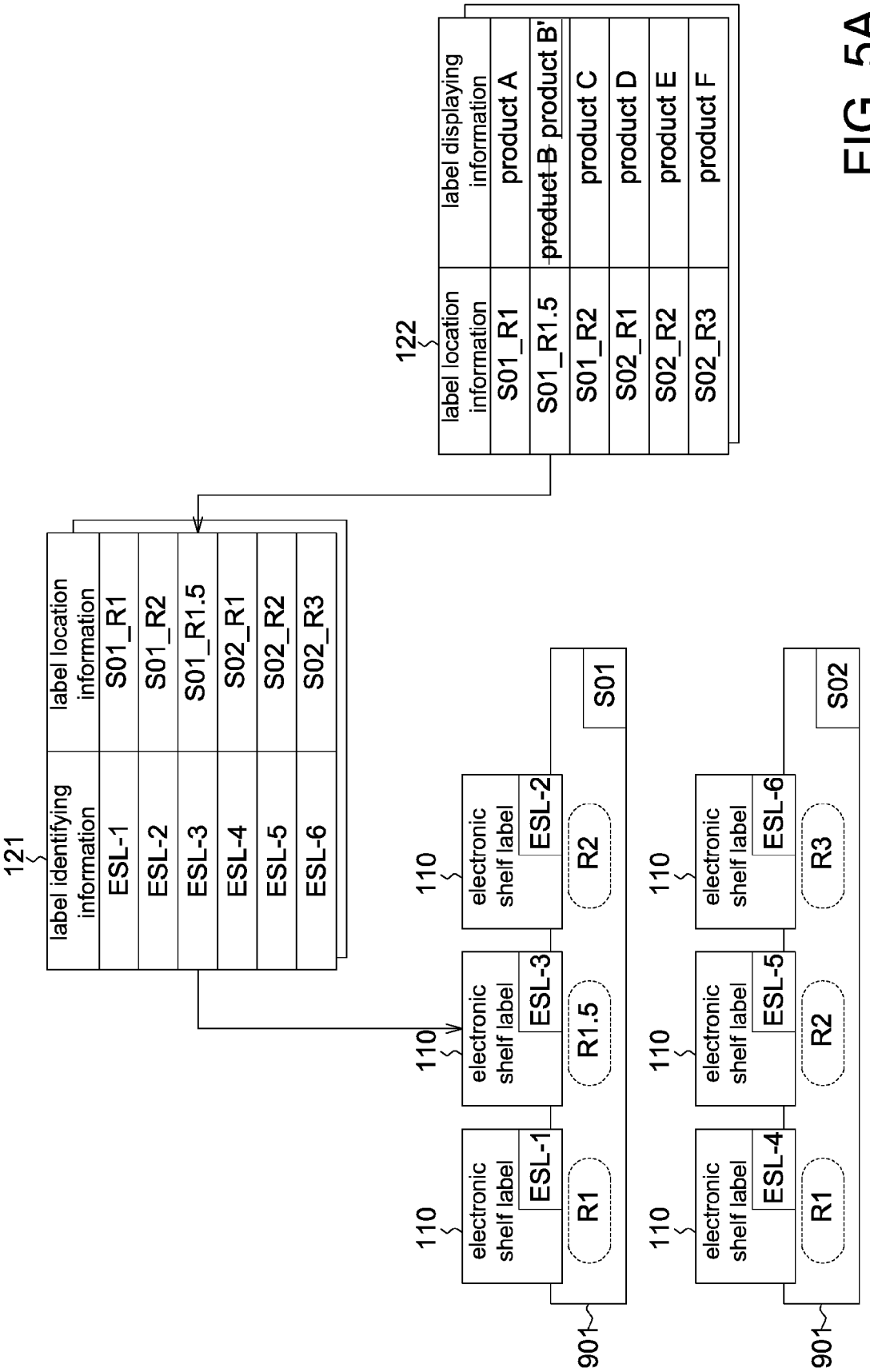
121
label identifying information
label location information
ESL-1
S01_R1
ESL-2
S01_R2
ESL-3
S01_R1.5
ESL-4
S02_R1
ESL-5
S02_R2
ESL-6
S02_R3
122
label location information
label displaying information
S01_R1
product A
S01_R1.5
~~product B~~ product B'
S01_R2
product C
S02_R1
product D
S02_R2
product E
S02_R3
product F
110
electronic shelf label
ESL-1
ESL-2
ESL-3
ESL-4
ESL-5
ESL-6
R1
R1.5
R2
R3
S01
S02
901

FIG. 5A

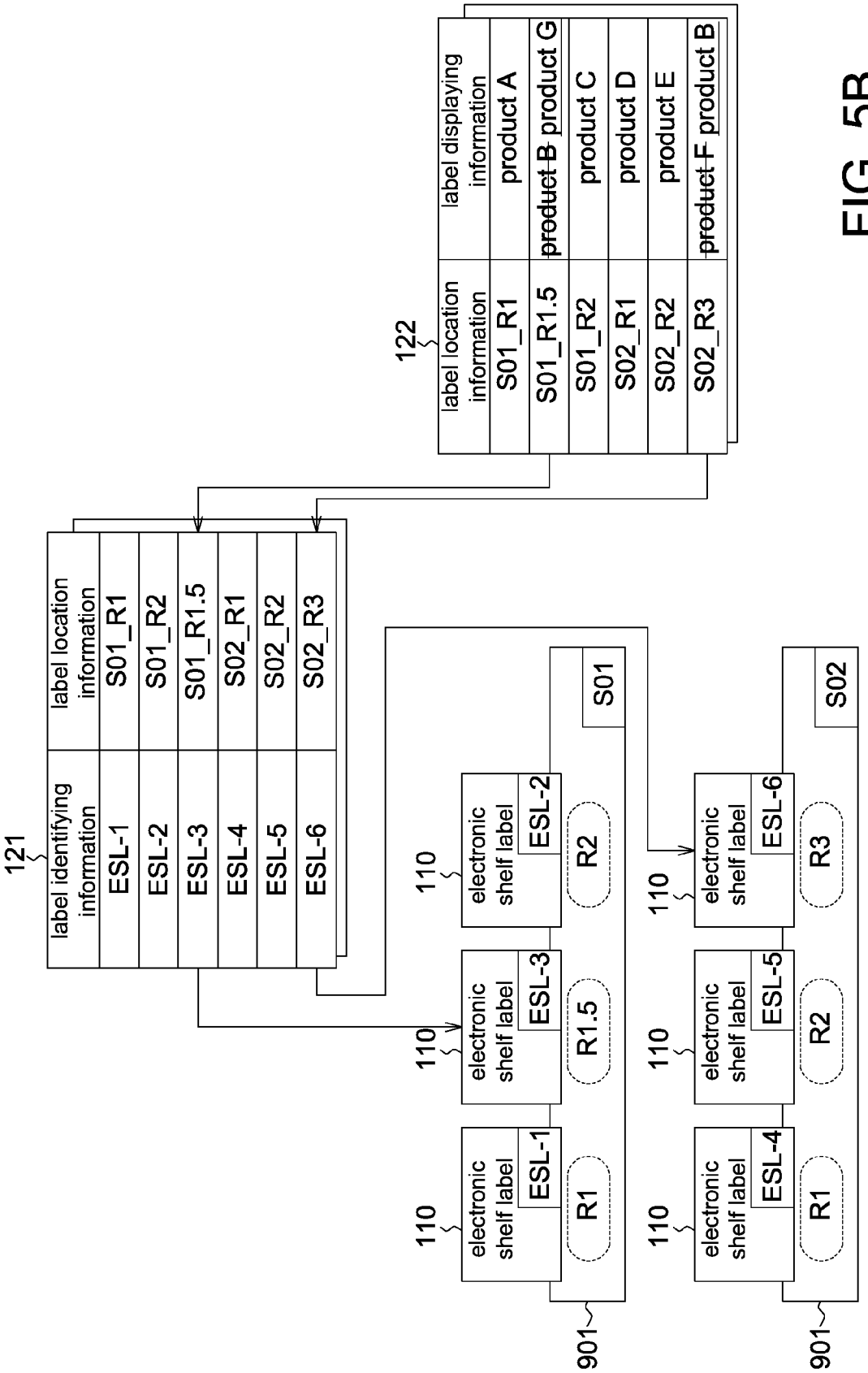
121
label identifying information
label location information
ESL-1
S01_R1
ESL-2
S01_R2
ESL-3
S01_R1.5
ESL-4
S02_R1
ESL-5
S02_R2
ESL-6
S02_R3
122
label location information
label displaying information
S01_R1
product A
S01_R1.5
product B
product G
S01_R2
product C
S02_R1
product D
S02_R2
product E
S02_R3
product F
product B
110
electronic shelf label
ESL-1
ESL-2
ESL-3
ESL-4
ESL-5
ESL-6
R1
R2
R1.5
R3
S01
S02
901

FIG. 5B

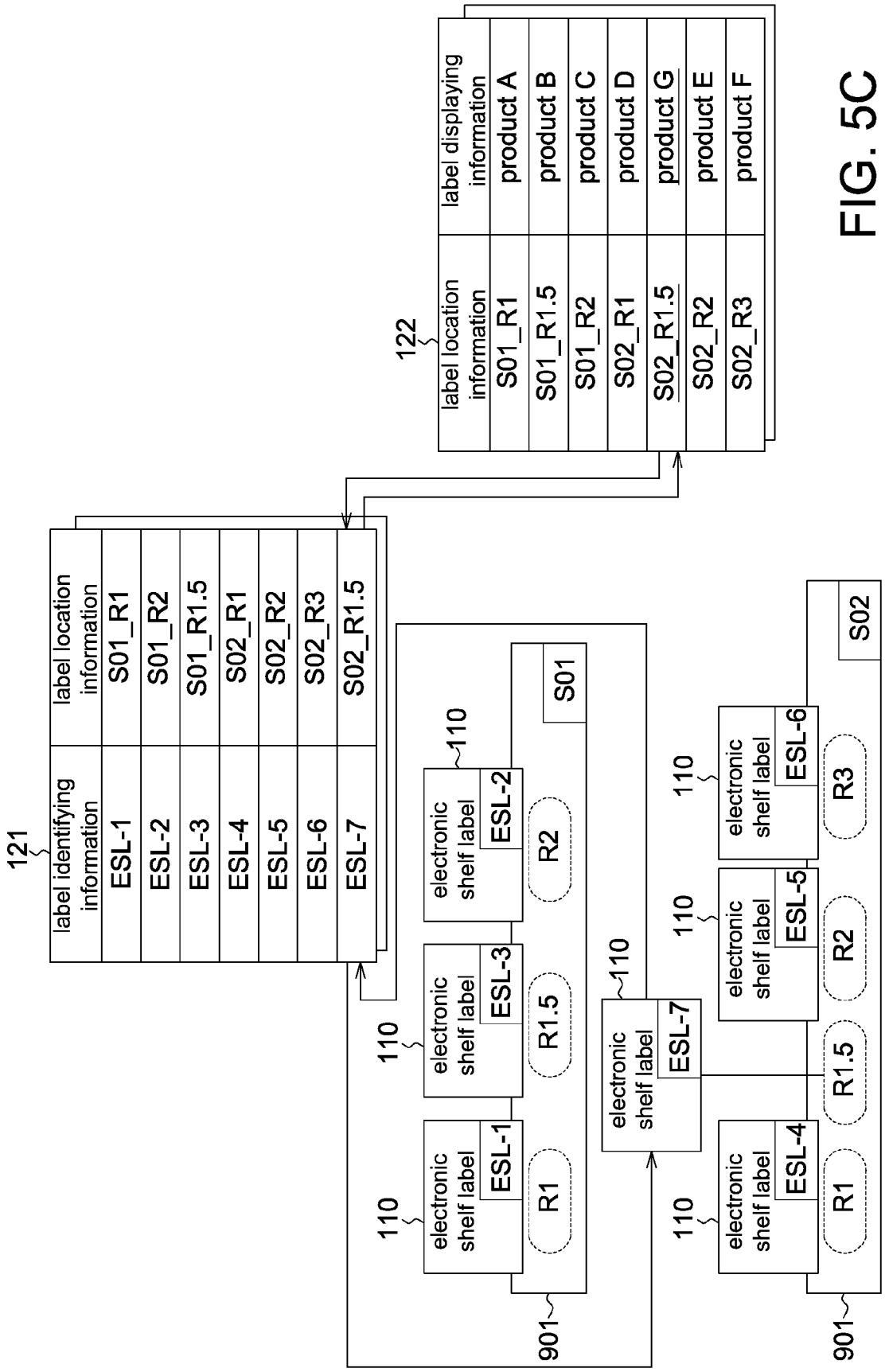
121
label identifying information
label location information
ESL-1 S01_R1
ESL-2 S01_R2
ESL-3 S01_R1.5
ESL-4 S02_R1
ESL-5 S02_R2
ESL-6 S02_R3
ESL-7 S02_R1.5
122
label location information
label displaying information
S01_R1 product A
S01_R1.5 product B
S01_R2 product C
S02_R1 product D
S02_R1.5 product G
S02_R2 product E
S02_R3 product F
110
electronic shelf label
ESL-1
ESL-2
ESL-3
ESL-4
ESL-5
ESL-6
ESL-7
R1
R1.5
R2
R3
S01
S02
901

FIG. 5C

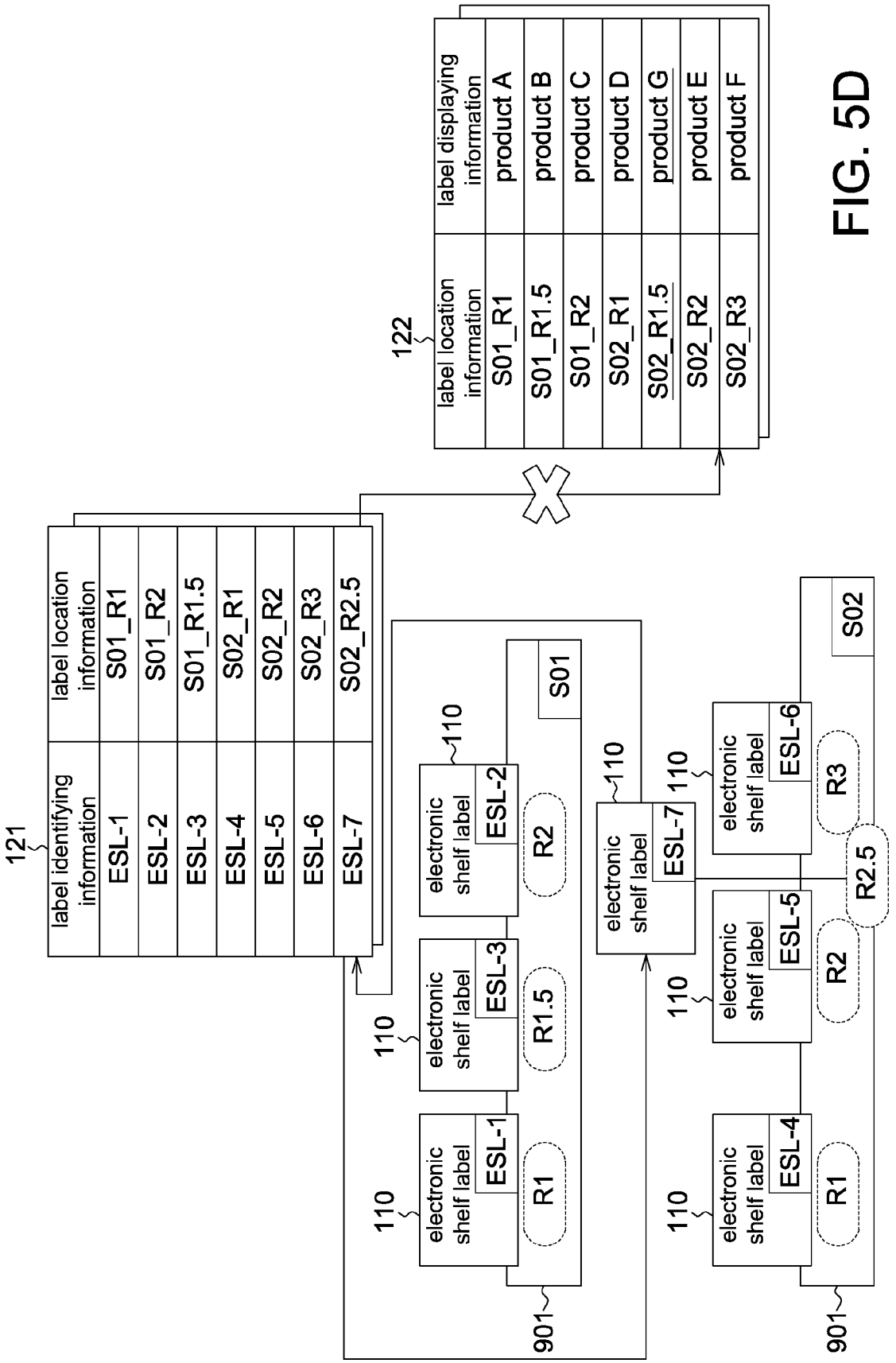
121
label identifying information
label location information
ESL-1 S01_R1
ESL-2 S01_R2
ESL-3 S01_R1.5
ESL-4 S02_R1
ESL-5 S02_R2
ESL-6 S02_R3
ESL-7 S02_R2.5
122
label location information
label displaying information
S01_R1 product A
S01_R1.5 product B
S01_R2 product C
S02_R1 product D
S02_R1.5 product G
S02_R2 product E
S02_R3 product F
110
electronic shelf label
ESL-1
ESL-2
ESL-3
ESL-4
ESL-5
ESL-6
ESL-7
R1
R1.5
R2
R2.5
R3
S01
S02
901

FIG. 5D

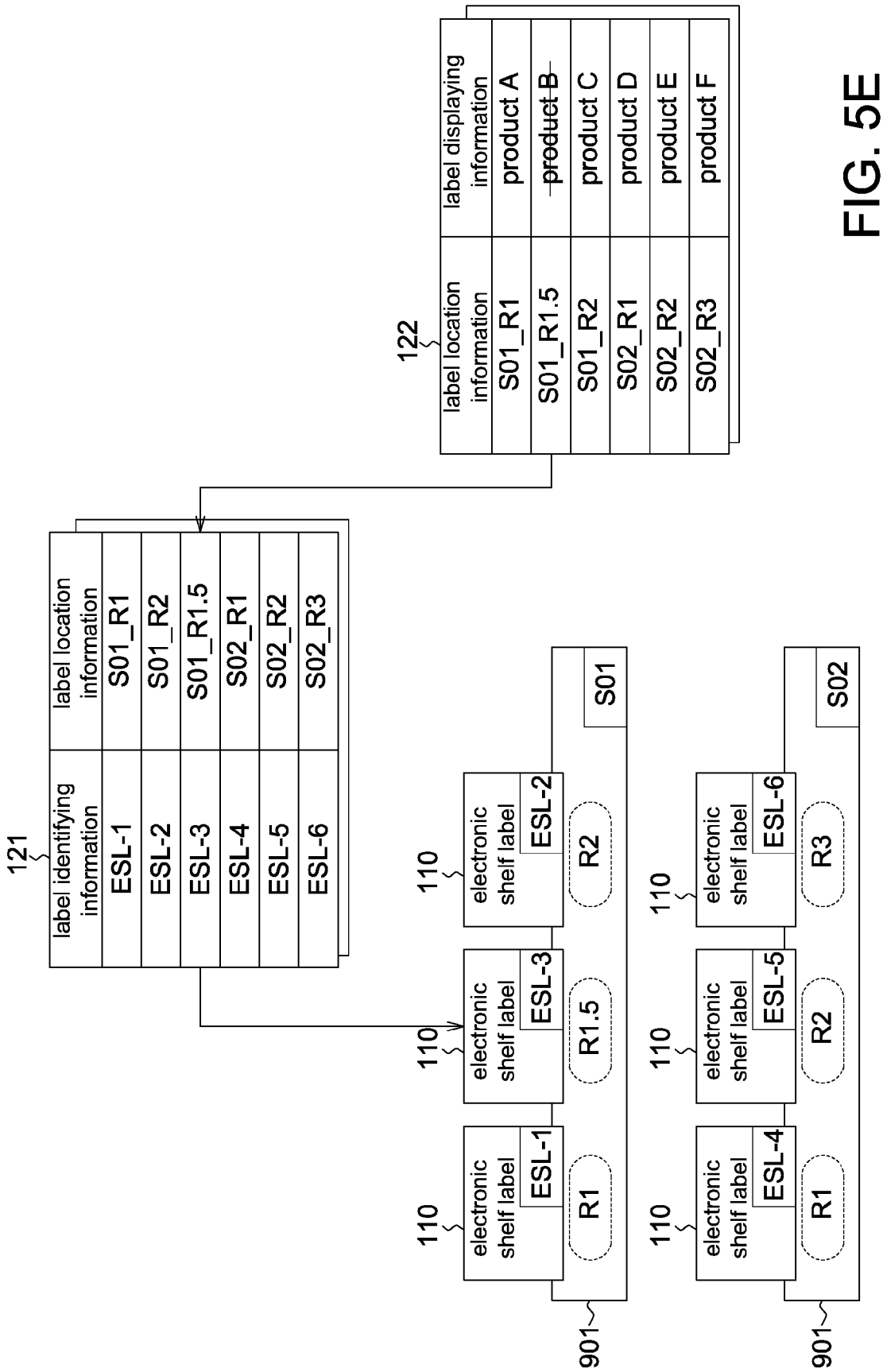
121
label identifying information
label location information
ESL-1
S01_R1
ESL-2
S01_R2
ESL-3
S01_R1.5
ESL-4
S02_R1
ESL-5
S02_R2
ESL-6
S02_R3
122
label location information
label displaying information
S01_R1
product A
S01_R1.5
~~product B~~
S01_R2
product C
S02_R1
product D
S02_R2
product E
S02_R3
product F
110
electronic shelf label
ESL-1
ESL-3
ESL-2
ESL-4
ESL-5
ESL-6
R1
R1.5
R2
R3
S01
S02
901

FIG. 5E

ELECTRONIC SHELF LABEL CONTROLLING SYSTEM, ELECTRONIC SHELF LABEL INSTALLING METHOD AND ELECTRONIC SHELF LABEL UPDATING METHOD

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Taiwan application Serial No. 102147781, filed Dec. 23, 2013, the disclosure of which is incorporated by reference herein in its entirety.

TECHNICAL FIELD

The disclosure relates in general to an electronic shelf label controlling system, an electronic shelf label installing method and an electronic shelf label updating method.

BACKGROUND

As the business development, varied products are provided for consumers to choose. While the products are arranged on a shelf, shelf labels can be used for informing the consumers the name, the price or the promotion of the products.

In conventional, since the shelf labels are made of printed papers and stuck on the shelf, it is time-consuming to use those shelf labels. Further, since the shelf labels cannot be reused, it is waste to use those papers.

Electronic shelf labels can display the product information in digital and can be reused without printing any paper. Therefore, it is a future trend to use the electronic shelf labels instead of the conventional shelf labels.

SUMMARY

The disclosure is directed to an electronic shelf label controlling system, an electronic shelf label installing method and an electronic shelf label updating method.

According to one embodiment, an electronic shelf label controlling system is provided. The electronic shelf label controlling system comprises at least an electronic shelf label, a controlling device, a deploying device and a communication gateway device. The electronic shelf label is disposed on a shelf. The controlling device stores a label location table. The label location table records a relationship between a label identifying information and a label location information of the electronic shelf label. The deploying device is used for obtaining the label identifying information. The communication gateway device is used for communicating the controlling device, the deploying device and the electronic shelf label.

According to one embodiment, an electronic shelf label installing method is provided. The electronic shelf label installing method comprises the following steps. A label identifying information of a first electronic shelf label is obtained. A label location information is obtained according to a location of the first electronic shelf label on a shelf. A relationship between the label identifying information and the label location information is created. A label location table is changed according to the relationship between the label identifying information and the label location information.

According to one embodiment, an electronic shelf label updating method is provided. A label content table records a relationship between a first label location information and a first label displaying information of a first electronic shelf label. A label location table records a first label identifying information and the first label location information of the first electronic shelf label. The electronic shelf label updating method includes the following steps. The label content table is changed. Whether a second electronic shelf label is needed to be installed, or the first electronic shelf label is needed to be removed according to the changed label content table is determined. The first label location information is obtained according to the changed label content table, if the second electronic shelf label is not needed to be installed, and the first electronic shelf label is not needed to be removed. The first label identifying information corresponding to the first label location information is obtained according to the label location table. The changed first label displaying information is transmitted to the first electronic shelf label.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an electronic shelf label controlling system.

FIG. **2** illustrates a flowchart of an electronic shelf label installing method.

FIG. **3**A shows an example of the electronic shelf label controlling system under a first case.

FIG. **3**B shows an example of the electronic shelf label controlling system under a second case.

FIG. **3**C shows another example of the electronic shelf label controlling system under the second case.

FIG. **3**D shows an example of the electronic shelf label controlling system under a third case.

FIGS. **4**A to **4**C illustrate a flowchart of an electronic shelf label updating method.

FIG. **5**A shows an example of the electronic shelf label updating method performing a first action.

FIG. **5**B shows an example of the electronic shelf label updating method performing a second action.

FIG. **5**C shows an example of the electronic shelf label updating method performing a third action.

FIG. **5**D shows another example of the electronic shelf label updating method performing the third action.

FIG. **5**E shows an example of the electronic shelf label updating method performing a fourth action.

In the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that one or more embodiments may be practiced without these specific details. In other instances, well-known structures and devices are schematically shown in order to simplify the drawing.

DETAILED DESCRIPTION

Please referring to FIG. **1**, an electronic shelf label controlling system **100** is shown. The electronic shelf label controlling system **100** includes at least one electronic shelf label **110**, a controlling device **120**, a deploying device **130** and a communication gateway device **140**.

The electronic shelf label **110** is disposed on a shelf **901**, for displaying varied product information, such as the name, the price, a barcode, a promotion information, or a product transferring instruction for placing the product on the shelf or removing the product from the shelf. For example, the electronic shelf label **110** may be a liquid crystal display, an organic light-emitting diodes display or an electronic paper display.

The controlling device **120** is used for storing varied tables and performing varied controlling procedures. For example, the controlling device **120** may be a network server, a desktops computer or a notebook computer. The communication

gateway device **140** is used for communicating the controlling device **120** and the deploying device **130**. In other embodiment, the communication gateway device **140** can be connected to the electronic shelf label **110** via wireless or cable for communication.

The communication gateway device **140** is used for transmitting varied information. For example, the communication gateway device **140** may be a wired network system or a wireless transmission system.

The deploying device **130** is used for reading the information of the shelf **901** or the electronic shelf label **110**. For example, the deploying device **130** may be a smart phone, a tablet PC or a handheld device. The information read from the deploying device **130** is transmitted to the controlling device **120** by the communication gateway device **140**.

The controlling device **120** stores a label location table **121** and a label content table **122**. The label location table **121** records a label identifying information and a label location information of the electronic shelf label **110**. The label content table **122** records the label location information and a label displaying information of the electronic shelf label **110**. The label identifying information is used for identifying the electronic shelf label **110**, such as "ESL-1." The label location information is used for recording the shelf **901** where the electronic shelf label **110** is disposed and the relative position on the shelf **901** where the electronic shelf label **110** is disposed, such as "S01_R1." "S01" is a shelf code and "R1" is a location code. The label displaying information is a product relating information and a product transferring instruction, such as "place or remove." For example, the label displaying information may be "ESL_DISP-1."

The manager can change the label content table **122** by the controlling device **120**, and then transmit the label displaying information to the electronic shelf label **110** according to the label location table **121**.

In one embodiment, a relationship between the label identifying information and the label location information can be created by the controlling device **120** (hereinafter a first architecture). In another embodiment, the relationship between the label identifying information and the label location information can be created by the deploying device **130** (hereinafter a second architecture).

Please referring to FIG. **2**, a flowchart of an electronic shelf label installing method is illustrated. In the installation of this electronic shelf label **110**, there are three cases: In a first case, there is no electronic shelf label on the shelf **901** before installing the electronic shelf label **110** to be installed, i.e. only the electronic shelf label **110** to be installed is disposed on the shelf **901** after installing the electronic shelf label **110** to be installed. In a second case, another electronic shelf label is already disposed at one side of the electronic shelf label **110** to be installed and there is no electronic shelf label disposed at another side of the electronic shelf label **110** to be installed after installing the electronic shelf label **110** to be installed. In a third case, two electronic shelf labels are already disposed at two sides of the electronic shelf label **110** to be installed after installing the electronic shelf label **110** to be installed. The steps under those three cases are different.

In step S**101**, the deploying device **130** obtains the label identifying information of the electronic shelf label **110** to be installed.

In step S**102**, which case the electronic shelf label **110** to be installed is under is determined. If only the electronic shelf label **110** to be installed is disposed on the shelf **901** after installing the electronic shelf label **110** to be installed, then the process proceeds to step S**103**; if another electronic shelf label is already disposed at one side of the electronic shelf label **110** to be installed and there is no electronic shelf label disposed at another side of the electronic shelf label **110** to be installed after installing the electronic shelf label **110** to be installed, then the process proceeds to step S**104**; if two electronic shelf labels are already disposed at two sides of the electronic shelf label **110** to be installed after installing the electronic shelf label **110** to be installed, then the process proceeds to step S**105**.

In steps S**103**, S**104** and S**105**, the deploying device **130** or the controlling device **120** creates the label location information of the electronic shelf label **110** to be installed. In step S**103**, the location code is obtained according to an initial value. The shelf code of the shelf **901** and the location code of the electronic shelf label **110** are combined to be the label location information. In step S**104**, the location code is obtained by performing a mathematical extrapolation on the electronic shelf label which is already installed. The shelf code of the electronic shelf label which is already installed and the location code are combined to be the label location information. In step S**105**, the location code is obtained by performing a mathematical interpolation on the electronic shelf labels which are already installed. The shelf codes of the electronic shelf labels which are already installed and the location code are combined to be the label location information.

In step S**106**, the deploying device **130** or the controlling device **120** creates the relationship between the label identifying information and the label location information.

In step S**107**, the controlling device **120** changes the label location table **121** according to the relationship between the label identifying information and the label location information.

In step S**108**, whether another new electronic shelf label is needed to be installed is determined. If another new electronic shelf label is needed to be installed, the process proceeds to S**101**; if no electronic shelf label is needed to be installed, the process is terminated.

If the electronic shelf label controlling system **100** adopts the first architecture, then the steps S**103** to S**106** can be performed by the controlling device **120**. If the electronic shelf label controlling system **100** adopts the second architecture, then the steps S**103** to S**106** can be performed by the deploying device **130**.

Please referring to FIG. **3**A, an example of the electronic shelf label controlling system **100** under the first case is shown. Regarding the shelf code of the electronic shelf label **110** to be installed, the shelf code, such as "S01" can be obtained from the shelf **901**, since there is no other electronic shelf label. Regarding the location code of the electronic shelf label **110** to be installed, the location code can be any initial value, such as "R1", since there is no other electronic shelf label.

Please referring to FIG. **3**B, an example of the electronic shelf label controlling system **100** under the second case is shown. On the shelf **901**, from left to right, the first electronic shelf label **110** whose label identifying information is "ESL-1" is already installed, the second electronic shelf label **110** whose label identifying information is "ESL-2" is to be installed. Regarding the shelf code of the electronic shelf label **110** to be installed, there is another electronic shelf label **110** located at the left side of the electronic shelf label **110** to be installed. The shelf code of the label location information of the electronic shelf label **110** which is already installed is "S01." The shelf code of the electronic shelf label **110** to be installed can be set as "S01." Regarding to the location code of the electronic shelf label **110** to be installed, there is another electronic shelf label **110** which located at the left

side of the electronic shelf label **110** to be installed. The location code of the label location information of the electronic shelf label **110** which is already installed is "R1." The location code of the electronic shelf label **110** to be installed can be "R2" by adding 1 to "R1." That is to say, the location code of the electronic shelf label **110** to be installed can be obtained by performing a mathematical extrapolation, such as addition or multiplication on the electronic shelf label **110** which is already installed, such that the location codes are incremented from left to right. In other embodiment, the location codes can be decremented from left to right.

Please referring to FIG. **3**C, another example of the electronic shelf label controlling system **100** under the second case is shown. From left to right, the first electronic shelf label **110** whose label identifying information is "ESL-2" is to be installed, and the second electronic shelf label **110** whose label identifying information is "ESL-1" is already installed. Regarding to the shelf code of the electronic shelf label **110** to be installed, there is another electronic shelf label **110** located at the right side of the electronic shelf label **110** to be installed. The shelf code of the label location information of the electronic shelf label **110** which is already installed is "S01." The shelf code of the electronic shelf label **110** to be installed can be set as "S01." Regarding to the location code of the electronic shelf label **110** to be installed, there is another electronic shelf label **110** which is located at the right side of the electronic shelf label **110** to be installed. The location code of the label location information of the electronic shelf label **110** which is already installed is "R1." The location code of the electronic shelf label **110** to be installed can be "R0.5" by dividing the number of "R1" by 2. In this case, the number of "R1" is 1. That is to say, the location code of the electronic shelf label **110** to be installed can be obtained by performing a mathematical extrapolation, such as subtraction or division on the electronic shelf label **110** which is already installed, such that the location codes are incremented from left to right.

Please referring to FIG. **3**D, an example of the electronic shelf label controlling system **100** under the third case is shown. From left to right, the first and third electronic shelf labels **110** whose label identifying information are "ESL-1" and "ESL-2" respectively are already installed, and the second electronic shelf label **110** whose label identifying information is "ESL-3" is to be installed. Regarding to the shelf code of the electronic shelf label **110** to be installed, there are two other electronic shelf labels **110** located at the left and right sides of the electronic shelf label **110** to be installed. The shelf codes of the label location information of the electronic shelf labels **110** which are already installed are "S01." The shelf code of the electronic shelf label **110** to be installed can be set as "S01." Regarding to the location code of the electronic shelf label **110** to be installed, the location code of the electronic shelf label **110** located at the left side of the electronic shelf label **110** to be installed is "R1", and the location code of the electronic shelf label **110** located at the right side of the electronic shelf label **110** to be installed is "R2." The location code of the electronic shelf label **110** to be installed can be "R1.5" by dividing the sum of the number of "R1" and "R2" by 2, such that the location code of the electronic shelf label **110** to be installed is between those two location codes. That is to say, the location code of the electronic shelf label **110** to be installed can be obtained by performing a mathematical interpolation, such that the location codes are incremented from left to right.

Please referring to FIGS. **4**A to **4**C, a flowchart of an electronic shelf label updating method is illustrated. The electronic shelf label updating method is performed under the following actions: First, the label displaying information is changed. Second, at least one product is transferred without installing any new electronic shelf label **110** and without removing any electronic shelf label **110**. Third, at least one product is transferred and at least one electronic shelf label **110** is needed to be installed. Fourth, at least one product is transferred and at least one electronic shelf label **110** is needed to be removed.

The first action is performed by steps S**401** to S**406** in FIGS. **4**A to **4**C. The second action is performed by steps S**401** to S**407** in FIGS. **4**A to **4**C. The third action is performed by step S**401**, S**402** and S**408** to S**415** in FIGS. **4**A to **4**C. The fourth action is performed by steps S**401**, S**402**, S**416** to S**418** in FIGS. **4**A to **4**C.

Please referring to FIGS. **4**A to **4**C and **5**A. FIG. **5**A shows an example of the electronic shelf label updating method performing the first action. In step S**401**, the label displaying information in the label content table **122** is changed. For example, "product B" is changed to be "product B'." The name of the product does not changed. Instead, the price may be changed or a promotion information may be added. In FIG. **5**A, the strikethrough means that the wordings have been cancelled, and the underscore means that the wordings are newly added.

In step S**402**, whether any new electronic shelf label **110** is needed to be installed or any installed electronic shelf label **110** is needed to be removed is determined according to the changes of the label content table **122**. If no new electronic shelf label **110** is needed to be installed and no installed electronic shelf label **110** is needed to be removed, then the process proceeds to step S**403**. If at least one new electronic shelf label **110** is needed to be installed, then the process proceeds to step S**408**. If at least one installed electronic shelf label **110** is needed to be removed, then the process proceeds to step S**416**. In FIG. **5**A, "product B" is changed to be "product B'." No new electronic shelf label **110** is needed to be installed and no installed electronic shelf label **110** is needed to be removed, the process proceeds to step S**403**.

In step S**403**, the label location information, such as "S01_R1.5", corresponding to the changed label displaying information, such as "product B'", is obtained according to the label content table **122**.

In step S**404**, the label identifying information, such as "ESL-3", corresponding to the label location information, such as "S01_R1.5", is obtained according to the label location table **121**.

In step S**405**, the changed label displaying information, such as "product B", is transmitted to the corresponding electronic shelf label **110**, such as "ESL-3."

In step S**406**, whether any product is needed to be transferred is determined. If at least one product is needed to be transferred, then the process proceeds to step S**407**. If no product is needed to be transferred, then the process proceeds to step S**401**. In FIG. **5**A, the name of the product in the label displaying information is not changed, so any product is not needed to be transferred and the process proceeds to step S**401**.

Please referring to FIGS. **4**A to **4**C and **5**B, FIG. **5**B shows an example of the electronic shelf label updating method performing the second action. In step S**401**, the label displaying information in the label content table **122** is changed. For example, "product B" is changed to be "product G" and "product F" is changed to be "product B." In FIG. **5**B, the strikethrough means that the wordings have been cancelled, and the underscore means that the wordings are newly added. That is to say, the product B is transferred to the location

where the product F is located, the product G is placed on the location where the product B is originally located, and the product F is removed.

In step S**402**, whether any new electronic shelf label **110** is needed to be installed or any installed electronic shelf label **110** is needed to be removed is determined according to the changes of the label content table **122**. If no new electronic shelf label **110** is needed to be installed and no installed electronic shelf label **110** is needed to be removed, then the process proceeds to S**403**. If at least one new electronic shelf label **110** is needed to be installed, then the process proceeds to step S**408**. If at least one installed electronic shelf label **110** is needed to be removed, then the process proceeds to step S**416**. In FIG. **5**B, "product B" is changed to be "product G" and "product F" is changed to be "product B." No new electronic shelf label **110** is needed to be installed and no installed electronic shelf label **110** is needed to be removed, the process proceeds to step S**403**.

In step S**403**, the label location information, such as "S01_R1.5" and "S02_R3", corresponding to the changed label displaying information, such as "product G" and "product B", is obtained according to the label content table **122**.

In step S**404**, the label identifying information, such as "ESL-3" and "ESL-6", corresponding to the label location information, such as "S01_R1.5" and "S02_R3", is obtained according to the label location table **121**.

In step S**405**, the changed label displaying information, such as "product G" and "product B", is transmitted to the corresponding electronic shelf labels **110**, such as "ESL-3" and "ESL-6."

In step S**406**, whether any product is needed to be transferred is determined. If at least one product is needed to be transferred, then the process proceeds to step S**407**. If no product is needed to be transferred, then the process proceeds to step S**401**. In FIG. **5**B, "product B" is changed to be "product G" and "product F" is changed to be "product B", so some products are needed to be transferred and the process proceeds to step S**407**.

In step S**407**, the product transferring instruction, such as "remove the product B and place the product G" and "remove the product F and place the product B" is transmitted to the electronic shelf labels **110**, such as "ESL-3" and "ESL-6."

Please referring to FIGS. **4**A to **4**C and **5**C, FIG. **5**C shows an example of the electronic shelf label updating method performing the third action. In step S**401**, the label displaying information in the label content table **122** is changed. For example, "product G" is inserted to be between "product D" and "product E." In FIG. **5**C, the underscore means that the wordings are newly added. That is to say, one row is added into the label content table **122**, and the label displaying information "product G" and the label location information "S02_R1.5" is added.

In step S**402**, whether any new electronic shelf label **110** is needed to be installed or any installed electronic shelf label **110** is needed to be removed is determined according to the changes of the label content table **122**. If no new electronic shelf label **110** is needed to be installed and no installed electronic shelf label **110** is needed to be removed, then the process proceeds to S**403**. If at least one new electronic shelf label **110** is needed to be installed, then the process proceeds to step S**408**. If at least one installed electronic shelf label **110** is needed to be removed, then the process proceeds to step S**416**. In FIG. **5**C, the label displaying information "product G" is newly added, so a new electronic shelf label **110** is needed to be installed and the process proceeds to step S**408**.

In step S**408**, after the manager disposes a new electronic shelf label **110** on the shelf **901**, such as the second electronic shelf label **110** on the lower shelf **901**, the label identifying information, such as "ESL-7", of the newly installed electronic shelf label **110** is obtained.

In step S**409**, the label location information, such as "S02_R1.5" is obtained according to the location of the newly installed electronic shelf label **110** on the shelf **901**.

In step S**410**, the relationship between the label identifying information, such as "ESL-7", and the label location information, such as "S02_R1", of the newly installed electronic shelf label **110** are created.

In step S**411**, the label location table **121** is changed according to the relationship between the label identifying information, such as "ESL-7" and the label location information, such as "S02_R1.5", of the newly installed electronic shelf label **110**.

In step S**412**, whether the label location information, such as "S02_R1.5", of the newly installed electronic shelf label **110** in the label location table **121** is identical to the label location information, such as "S02_R1.5", corresponding to the changed label displaying information, such as "product G", in the label content table **122** is determined.

If the label location information, such as "S02_R1.5" in the label location table **121** is identical to the label location information, such as "S02_R1.5", corresponding to the changed label displaying information, such as "product G", in the label content table **122**, then the process proceeds to step S**413**. If the label location information, such as "S02_R1.5", in the label location table **121** is not identical to the label location information, such as "S02_R1.5", corresponding to the changed label displaying information, such as "product G", in the label content table **122**, then the process proceeds to S**415**.

In step S**413**, the label displaying information, such as "product G" is transmitted to the newly installed electronic shelf label **110**.

In step S**414**, the product transferring instruction, such as "place product G" is transmitted to the newly installed electronic shelf label **110**.

Please referring to FIGS. **4**A to **4**C and **5**D, FIG. **5**D shows another example of the electronic shelf label updating method performing the third action. In FIG. **5**D. when the process proceeds to step S**412**, whether the label location information of the newly installed electronic shelf label **110** in the label location table **121** is identical to the label location information corresponding to the changed label displaying information in the label content table **122** is determined.

Referring to FIG. **5**D, since the label location information, such as "S02_R2.5" in the label location table **121** is not identical to the label location information, such as "S02_R1.5", corresponding to the label displaying information, such as "product G", in the label content table **122**, so the process proceeds to step S**415**.

In step S**415**, an installation error information, such as "Location error! Please try again!," is transmitted to the newly installed electronic shelf label **110**.

Please referring to FIGS. **4**A to **4**C and **5**E, FIG. **5**E shows an example of the electronic shelf label updating method performing the fourth action. In step S**401**, the label displaying information in the label content table **122** is changed. For example, "product B" is removed. In FIG. **5**E, the strikethrough means that the wordings have been cancelled. That is to say, the product B is removed from the shelf. In one embodiment, if one row of the label displaying information in the label content table **122** is cancelled, the corresponding electronic shelf label **110** is needed to be removed and the corresponding row of the label content table **122** is needed to be removed.

In step S**402**, whether any new electronic shelf label **110** is needed to be installed or any installed electronic shelf label **110** is needed to be removed is determined according to the changes of the label content table **122**. If no new electronic shelf label **110** is needed to be installed and no installed electronic shelf label **110** is needed to be removed, the process proceeds to S**403**. If at least one new electronic shelf label **110** is needed to be installed, the process proceeds to step S**408**. If at least one installed electronic shelf label **110** is needed to be removed, the process proceeds to step S**416**. In FIG. **5**E, "product B" is cancelled, so the corresponding electronic shelf label **110** is needed to be removed and the process proceeds to step S**416**.

In step S**416**, the label location information, such as "S01_R1.5", corresponding to the cancelled label displaying information, such as product B" is obtained according to the label content table **122**.

In step S**417**, the label identifying information, such as "ESL-3", corresponding to the label location information, such as "S01_R1.5", is obtained according to the label location table **121**.

In step S**418**, the product transferring instruction, such as "remove product B" is transmitted to the electronic shelf label **110** to be removed.

It will be apparent to those skilled in the art that various modifications and variations can be made to the disclosed embodiments. It is intended that the specification and examples be considered as exemplary only, with a true scope of the disclosure being indicated by the following claims and their equivalents.

What is claimed is:

1. An electronic shelf label controlling system, comprising:

a first electronic shelf label disposed on a shelf;

a controlling device storing a label location table, the label location table recording a relationship between a label identifying information and a label location information of the first electronic shelf label;

a deploying device used for obtaining the label identifying information; and

a communication gateway device used for communicating between the controlling device, the deploying device and the first electronic shelf label;

wherein the controlling device further obtains a location code of the first electronic shelf label by performing a mathematical interpolation on a second electronic shelf label and a third electronic shelf label if the second electronic shelf label and the third electronic shelf label are disposed at two sides of the first electronic shelf label, the location code of the first electronic shelf label is between a location code of the second electronic shelf label and a location code of the third electronic shelf label, and a shelf code of the second electronic shelf label and the location code of the first electronic shelf label are combined to be the label location information.

2. The electronic shelf label controlling system according to claim **1**, wherein the relationship between the label identifying information and the label location information is created by the controlling device.

3. The electronic shelf label controlling system according to claim **1**, wherein the relationship between the label identifying information and the label location information is created by the deploying device.

4. The electronic shelf label controlling system according to claim **1**, wherein the first electronic shelf label is used for displaying a label displaying information, the controlling device is further used for storing a label content table, and the label content table records a relationship between the label location information and the label displaying information.

5. An electronic shelf label installing method, comprising:

obtaining a label identifying information of a first electronic shelf label;

obtaining a label location information according to a location of the first electronic shelf label on a shelf;

creating a relationship between the label identifying information and the label location information; and

changing a label location table according to the relationship between the label identifying information and the label location information;

wherein the step of obtaining the label location information includes:

obtaining a location code of the first electronic shelf label by performing a mathematical interpolation on a second electronic shelf label and a third electronic shelf label if the second electronic shelf label and the third electronic shelf label are disposed at two sides of the first electronic shelf label, wherein the location code of the first electronic shelf label is between a location code of the second electronic shelf label and a location code of the third electronic shelf label, and a shelf code of the second electronic shelf label and the location code of the first electronic shelf label are combined to be the label location information.

6. The electronic shelf label installing method according to claim **5**, wherein the step of obtaining the label location information includes:

obtaining a location code according to an initial value if only the first electronic shelf label is disposed on the shelf, wherein a shelf code of the shelf and the location code of the first electronic shelf label are combined to be the label location information.

7. The electronic shelf label installing method according to claim **5**, wherein the step of obtaining the label location information includes:

obtaining the location code of the first electronic shelf label by performing a mathematical extrapolation on the second electronic shelf label if the second electronic shelf label is disposed at one side of the first electronic shelf label, wherein the location code of the first electronic shelf label and the location code of the second electronic shelf label are incremented or decremented, and the shelf code of the second electronic shelf label and the location code of the first electronic shelf label are combined to be the label location information.

8. An electronic shelf label updating method, wherein a label content table records a relationship between a first label location information and a first label displaying information of a first electronic shelf label, a label location table records a relationship between a first label identifying information and the first label location information of the first electronic shelf label, and the electronic shelf label updating method includes:

changing the label content table by changing first label displaying information;

looking up the changed label content table to know whether a second electronic shelf label is needed to be installed, or the first electronic shelf label is needed to be removed;

obtaining the first label location information according to the changed label content table, if the second electronic shelf label is not needed to be installed and the first electronic shelf label is not needed to be removed;

obtaining the first label identifying information corresponding to the first label location information according to the label location table;

transmitting the changed first label displaying information to the first electronic shelf label; and

transmitting a product transferring instruction to the first electronic shelf label.

9. The electronic shelf label updating method according to claim **8**, further comprising:

obtaining a second label identifying information of the second electronic shelf label, if the second electronic shelf label is needed to be installed;

obtaining a second label location information according to the location of the second electronic shelf label on a shelf;

creating a relationship between the second label identifying information and the second label location information;

changing the label location table according to the relationship between the second label identifying information and the second label location information;

determining whether the second label location information is identical to a third label location information corresponding to the second label displaying information in the label content table; and

transmitting a second label displaying information which is added to the label content table to the second electronic shelf label, if the second label location information is identical to the third label location information corresponding to the second label displaying information in the label content table.

10. The electronic shelf label updating method according to claim **9**, further comprising:

transmitting an error information to the second electronic shelf label, if the second label location information is not identical to the third label location information corresponding to the second label displaying information in the label content table.

11. The electronic shelf label updating method according to claim **9**, further comprising:

transmitting the product transferring instruction to the second electronic shelf label.

12. The electronic shelf label updating method according to claim **8**, further comprising:

obtaining the first label location information corresponding to the first label displaying information according to the label content table, if the first electronic shelf label is needed to be removed; and

obtaining the first label identifying information corresponding to the first label location information according to the label location table.

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