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EP-A2- 1 793 326
US-B1- 6 903 656

DESCRIPTION

Field of the Invention

[0001] The present invention relates to a shelving system and an associated dividing element that is able to provide information on electronically tagged items placed on the shelf.

Background to the Invention

[0002] Systems known as "smart shelving" and "intelligent shelving" have now been in existence for some time. These systems typically include an RFID antenna within the body of the shelf or positioned above the shelf that is used to communicate with radio frequency identifier (RFID) tags placed on or in items on the shelf. Such shelving systems are used by retailers to identify when stock levels are running low and also by facilities such as libraries to identify whether articles have been placed on the incorrect shelves.

[0003] Such systems are extremely difficult to retrofit. Where a retrofit is not possible, existing shelving must first be removed which significantly increases costs. Indeed, given the integration of the antenna within the shelf unit itself, a great deal of cost is associated with introduction of such smart or intelligent shelving systems.

[0004] An additional problem experienced with the systems is that typically the shelving systems cannot identify where on a particular shelf an item may be located. They normally can only identify whether or not an item is present on that shelf but nothing more. EP 1793326 discloses a system for detecting RFID tags. US 6903656 discloses an RFID reader.

Statement of the Invention

[0005] According to an aspect of the present invention there is provided a retrofit intelligent shelving system as claimed in claim 1. Preferably, each of the one or more dividing elements includes an interface for connection to the track. Most preferably, the interface is positioned such that the orientation of the dividing element when connected to the track causes the detection plane of the antenna to be substantially aligned with the items to be detected. Preferably the track includes a power supply means for providing power to the one or more dividing elements. The track may be a bus.

[0006] The one or more dividing elements may include an audio and/or visual indicator that is controllable by the dividing element and/or the controller. For example, where a number of dividing elements are positioned along the length of a shelf, the controller may trigger one or more of the dividing elements to activate the audio and/or visual indicator to flag itself to a

user. This may be used to indicate where an item should be placed, where an item is out of place or where an item exists that is being searched for.

[0007] Optionally, the antenna may operate in dual opposing directions.

[0008] The visual indicator may include an LCD display.

[0009] In a preferred embodiment of the present invention, the one or more dividing elements may each include an antenna control system for communication with other dividing elements and/or detection of overlapping transmission fields from other antennas, the antenna control system being configured to coordinate with the other dividing elements to optimise transmission signal strength. The antenna control system may include a subsidiary antenna for monitoring of other overlapping signals.

[0010] Preferably, the dividing elements include an RFID transceiver for communication with RFID tags via the antenna.

[0011] According to another aspect of the present invention, there is provided a retrofit dividing element for an intelligent shelving system as claimed in claim 13.comprising one or more dividing elements coupleable to a controller via a track wherein each of the one or more dividing elements includes:

an antenna having a detection plane;

a transceiver coupled to the antenna;

a base for placement on a shelf; and,

an interface for connection to the track and being coupled to the transceiver;

the transceiver being arranged to receive signals of detected electronically tagged items falling within the detection plane the antenna and communicate data on said signals to the controller via the interface.

[0012] The system may further comprise a power supply connectable to the track, wherein the interface of each of the one or more dividing elements includes a power connector for obtaining power for the dividing element from the power supply via the track.

[0013] According to another aspect of the present invention, there is provided a retrofit dividing element as claimed in claim 13.

[0014] The interface may include a wired connector for connection to a bus.

[0015] The interface may include a radio frequency transceiver for communication with the

remote controller.

Brief Description of the Drawings

[0016] Embodiments of the present invention will now be described in detail with reference to the accompanying drawings in which:

Figure 1 is a schematic diagram of an intelligent shelving system according to an embodiment of the present invention;

Figure 2 is a perspective view of an intelligent shelving system according to an embodiment of the present invention in use; and,

Figure 3 is another perspective view of an intelligent shelving system according to an embodiment of the present invention when in use.

Detailed description

[0017] Figure 1 is a schematic diagram of an intelligent shelving system according to an embodiment of the present invention.

[0018] The intelligent shelving system 10 includes a dividing element 20 and a controller 30. The controller 30 is connected to the dividing element 20 via a communications link 40.

[0019] The dividing element includes an antenna 21, antenna control system 22, an RFID transceiver 24 and an interface 25. The dividing element connects to the communication link 40 via the interface 25. In a preferred embodiment of the present invention, the communications link 40 provides both data communications functionality between the controller 30 and the dividing element 20 and also power to the dividing element 20.

[0020] Figure 2 is a perspective view of the intelligent shelving system 10 of Figure 1 in use.

[0021] The intelligent shelving system 10 is installed for use in conjunction with an existing shelving system 50. The controller 30 connects via communication link 40 to a number of dividing elements 20a-c. Tagged items 60-80 are placed at various locations on the shelving system 50.

[0022] If a user wishes to perform a stock inventory of items on the shelving system 50, an appropriate function is triggered on the controller. The controller communicates via communication link 40 to the dividing elements 20a-c which each in turn use their respective RFID transceiver 24 and antenna 21 to read the RFID tags of the items within range. In the

illustrated embodiment the antenna 21 are uni-directional having a detection field 21' as illustrated. However, it will be appreciated that bidirectional antennas could also be used or multiple opposing facing antennas to enable dividing elements 20 to interrogate tags in both directions. Data read from the tags is transmitted via communication link 40 back to the controller 30 to enable the inventory to be compiled.

[0023] The dividing elements 20a-c may include one or more indicators 26 that could be sounded or illuminated or otherwise used to alert the user's attention. In such a scenario, the indicator 26 of two adjacent dividing elements 20 could be illuminated if an item is incorrectly placed between the two dividing elements 20 or if an item is to be placed between them. Different indicators or indicator patterns may be used to indicate incorrectly located items and correct locations.

[0024] Alternatively, the user may know that the indicator of dividing element 20 refers to items to its left or right depending on configuration of the system. Where bidirectional antennas are used or multiple antennas, multiple indicators may also be used to indicate the direction in which the item should be placed to the side of the divider.

[0025] Optionally, the indicator may include an LCD display to provide further information to the user. For example, the controller may be able to interrogate the RFID tags via the respective dividing elements to provide an exact location of a particular item and provide an appropriate prompt in the closest LCD display such as "fifth item to the right".

[0026] In the illustrated preferred embodiment, the communication link 40 runs along the length at the back of the shelf. This configuration is preferred because this enables the interface 25 of each dividing element 20 to be appropriately placed at the rear of the dividing element. By connecting the interface 25 to the communication link, it can be ensured that the dividing element 20 has its antenna 21 oriented in the correct direction such that its detection field is aligned with elements positioned on the shelf.

[0027] Each dividing element 20 may include some form of securing mechanism to secure it to the shelf to prevent it being knocked over or moved. Additionally, in this manner the dividing element 20 may be used as a traditional shelf divider for dividing areas of shelves, supporting items that may not be able to support themselves etc.

[0028] The dividing elements may be appropriately covered for branding and improvement of aesthetic appearance and the like.

[0029] Figure 3 is a perspective view of an intelligent shelving system according to another aspect of the present invention.

[0030] In the illustrated embodiment, multiple dividing elements 20a-c communicate with each other to negotiate appropriate antenna power settings and other settings such that an appropriate detection field can be maintained by each dividing element such that it does not

overlap with that of other dividing elements 20. This is preferably achieved by a processor 28 located within each dividing element 20 that operates negotiations on a peer-to-peer basis.

[0031] Other configurations and indeed additions can be envisaged. Various algorithms could be implemented by the controller and/or dividing elements to determine location of items on shelves, ordering and the like.

[0032] Although tags have been discussed purely based on RFID technology, other tagging technologies could also be used and fall within the scope of the presently claimed invention.

[0033] The communication link 40 could be a bus of some form. It may be in the form of a track. Preferably, the communication link 40 is arranged such that a dividing element 20 can be connected at any point along its length and such that multiple dividing elements 20 can be connected to it at any one time. The communication link 40 could be used purely for power provision and wireless communications could be used between dividing elements and also from dividing elements to the controller. In such an arrangement, the dividing elements may communicate using a shared RF signal with selection data and the like being superimposed on the signal.

[0034] As an alternative to using the track/bus for a physical wired connection, it will be appreciated that induction based powering of the dividing elements is also possible.

[0035] The intelligent shelving system is preferably arranged to be retro-fitted to existing shelving systems.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- [EP1793326A](#) **[0004]**
- [US6903656B](#) **[0004]**

PATENTKRAV

1. Eftermonterbart intelligent reolsystem (10), konfigureret til at blive placeret på en hylde i et eksisterende reolsystem (50), hvilken hylde har en bæreflade med en længde
5 og en dybde, **kendetegnet ved, at** det eftermonterbare intelligente reolsystem (10) omfatter:

ét eller flere skilleelementer (20), som er indrettede til at kommunikere med en styring (30), idet hvert af det ene eller flere skilleelementer (20) omfatter:

10

en antenne (21) med et detektionsplan og;

en basis til placering på bærefladen på hylden til at strække sig langs dennes dybde og opdele hylden langs længden af dennes bæreflade, idet detektionsplanet for antenne (21) er i det væsentlige parallel med basis,

15

hvor hvert af det ene eller flere skilleelementer (20) er indrettet til at identificere elektronisk mærkede elementer (60-80), som befinder sig indenfor detektionsplanet for dens respektive antenne (21) og kommunikere data for de identificerede elementer til styringen (30),

20

det eftermonterbare intelligente reolsystem omfatter yderligere en kommunikationsforbindelse (40), som forbinder hvert af det ene eller flere skilleelementer (20) med styringen (30), idet kommunikationsforbindelsen (40) omfatter en transmissionsvej indrettet til at forløbe langs overfladen af hylden.

25

2. Eftermonterbart intelligent reolsystem ifølge krav 1, hvor hvert af det ene eller flere skilleelementer (20) omfatter en interface (25) til forbindelse med transmissionsvejen.

30

3. Eftermonterbart intelligent reolsystem ifølge krav 2, hvor interfacen (25) er placeret i hvert skilleelement (20) således, at orienteringen af skilleelementet, når dette er forbundet med transmissionsvejen, forårsager at detektionsplanet for antennen er orienteret i en retning i det væsentlige oprettet med længderetningen for bærefladen.

35

4. Eftermonterbart intelligent reolsystem ifølge krav 1, 2 eller 3, hvor transmissionsvejen omfatter en effektforsyningsindretning til at forsyne effekt til det ene eller flere skilleelementer (20).

5. Eftermonterbart intelligent reolsystem ifølge ethvert af de foregående krav, hvor transmissionsvejen er en bus.

5 6. Eftermonterbart intelligent reolsystem ifølge ethvert af de foregående krav, hvor det ene eller flere skilleelementer omfatter en akustisk og/eller visuel indikator (26), som kan styres af skilleelementet (20) og/eller styringen (30).

10 7. Eftermonterbart intelligent reolsystem ifølge krav 6, hvor det ene eller flere skilleelementer (20) hver især omfatter et LCD display.

15 8. Eftermonterbart intelligent reolsystem ifølge krav 6 eller 7, hvor styringen kan triggere af en bruger til at udføre en lageroptælling for elementer på reolsystemet og, efter at være trigget er indrettet til at kommunikere med det ene eller hvert skilleelement (20) for tilvejebringelse af data for elektronisk mærkede elementer (60-80), som befinder sig i detektionsplanet for dets respektive antenne (21), idet det intelligente reolsystem (10) er indrettet til at overvåge med hensyn til ukorrekt placerede elementer og styrer den akustiske og/eller visuelle indikator (26) i et respektivt skilleelement (20) til at identificere tilstedeværelsen af et ukorrekt placeret element.

20 9. Eftermonterbart intelligent reolsystem ifølge ethvert af de foregående krav, hvor det ene eller flere skilleelementer (20) hver især omfatter et antennestyresystem (22) til kommunikation med andre af det ene eller flere skilleelementer (20) og/eller til detektion af overlappende transmissionsfelter med andre antenner, idet antennestyresystemet (22) er konfigureret til at koordinere med de øvrige skilleelementer (20) for at optimere
25 transmissionssignalstyrke.

10. Eftermonterbart intelligent reolsystem ifølge krav 9, hvor antennestyresystemet (22) yderligere omfatter en hjælpeantenne til at overvåge for andre overlappende signaler.

30 11. Eftermonterbart intelligent reolsystem ifølge ethvert af de foregående krav, hvor det ene eller flere skilleelementer (20) hver især omfatter en RFID transceiver (24) til kommunikation med RFID tags via deres respektive antenne (21).

35 12. Eftermonterbart intelligent reolsystem ifølge ethvert af de foregående krav, hvor det ene eller flere skilleelementer (20) hver især omfatter:

en fastgørelsesmekanisme til at fastgøre det respektive skilleelement (20) til hylden;
og
en bæreflade, som strækker sig langs dybden af hylden til at understøtte elementer på hylden, som læner sig imod eller ligger an mod bærefladen.

5

13. Eftermonterbart skilleelement (20) til et intelligent reolsystem (10), hvilket skilleelement omfatter:

en antenne (21) med et detektionsplan;

10

en transceiver (24), som er forbundet med antennen;

en basis til placering på en bæreflade på en hylde til at strække sig langs dennes dybde og opdele hylden langs længden af dennes bæreflade; og

en interface (25) til kommunikation med en fjernstyring;

15

hvor transceiveren (24) er indrettet til at modtage signaler fra detekterede elektronisk mærkede elementer (60-80), som befinder sig i detektionsplanet for antennen (21) og kommunikere data for disse signaler til styringen via interfacen.

14. Eftermonterbart skilleelement (20) ifølge krav 13, hvor interfacen (25) omfatter en trådet forbindelse til forbindelse med en bus.

20

15. Eftermonterbart skilleelement (20) ifølge krav 13, hvor interfacen omfatter en radiofrekvenstransceiver (24) til kommunikation med fjernstyringen.

DRAWINGS

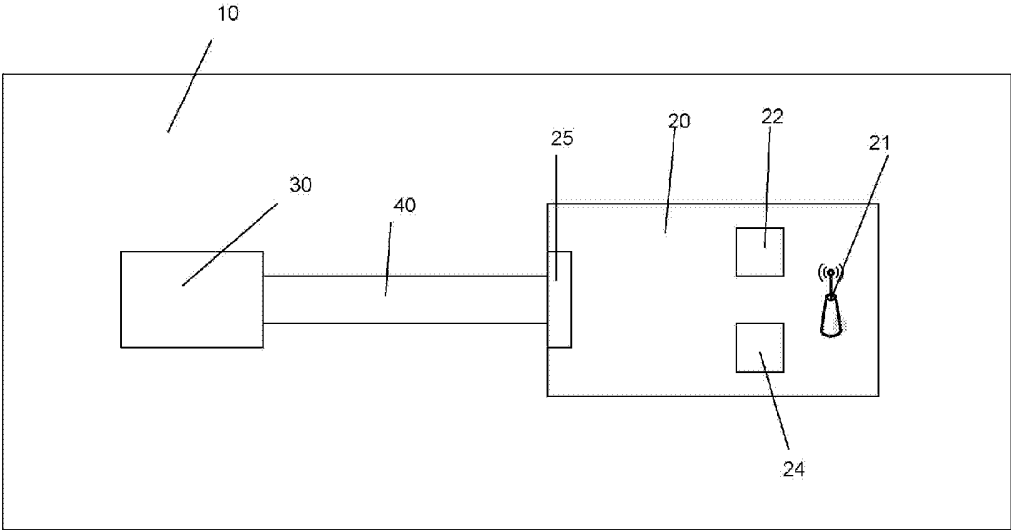
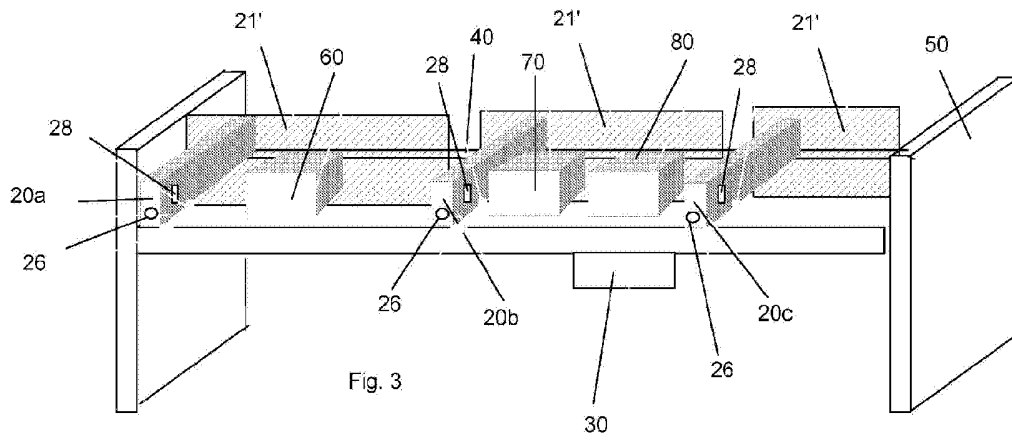


Fig. 1



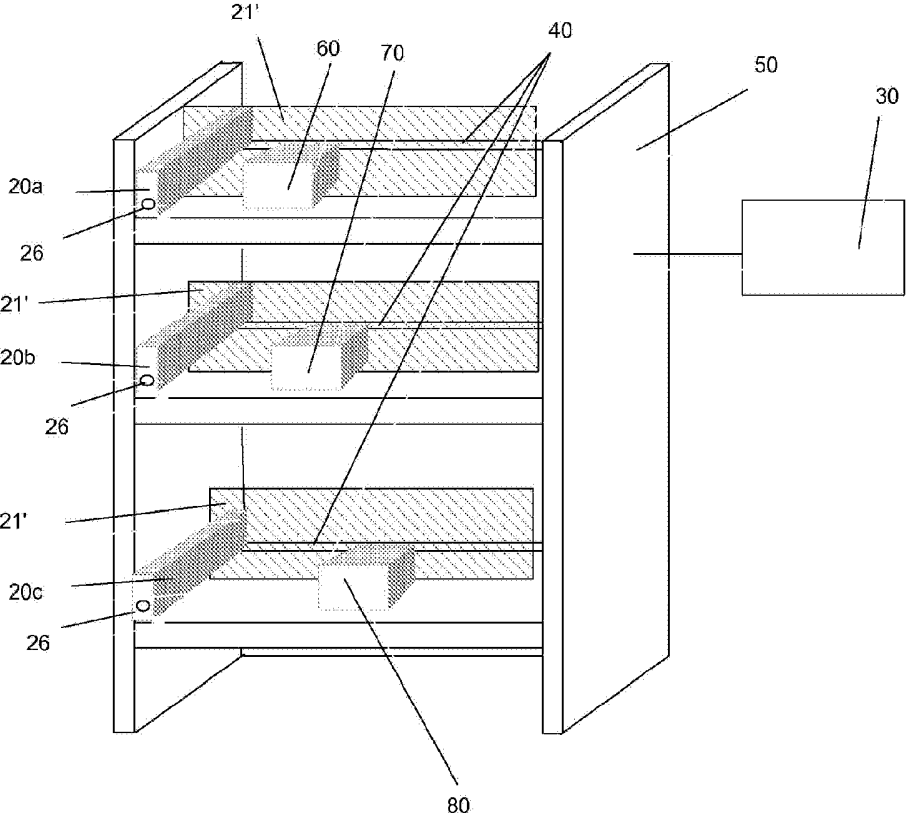


Fig. 2