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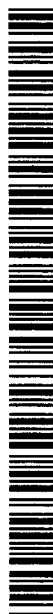
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(54) Title: LIBRARY SYSTEM WITH ELECTRONIC IDENTIFICATION AND LOCKING OF COMPACT DISKS

(57) Abstract: A library system arranged for borrowers themselves to check out objects provided with a non-contact identification label, in which, in addition to a number and other relevant information, there is also stored information for activating an antitheft system. The library pass is provided with the same type of label and with a reprintable layer, to specify the borrowed objects. The CD boxes are also provided with the same type of label, are magnetically lockable and have standard outside dimensions. Via a check-out and a check-in terminal, the objects to be borrowed can be coupled to and uncoupled from a library pass, the antitheft function can be deactivated and activated, and the CD boxes can be unlocked and locked. The check-in terminal can also be automated, whereby the borrowed objects are presented via a letterbox. Identification of the borrower is also possible on the basis of biometric features. With a portable transmitter/receiver, an inventory of the objects present in the library can be made.

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Title: Library system with electronic identification and locking of compact disks.

This invention relates to a system for automating the lending service of a library, whereby the borrowers themselves take care of checking out the materials to be borrowed. In libraries, it is customary for the counter personnel to take care of registering or checking out the materials to be
5 borrowed. This typically involves reading the barcode of the library pass into the computer, so that it can thereupon be coupled to the barcodes of the objects to be borrowed, such as books or compact disks (CDs) with music, computer software or videos. Often, optionally, for each object a slip stating the lending period is printed, and an antitheft label present in the object is
10 deactivated, so that no alarm is produced at the exit. In the case of libraries, this antitheft label mostly consists of a magnetizable strip of soft-magnetic amorphous metal, on which one or more strips of hard-magnetic material are provided. By magnetizing the hard-magnetic material, the soft-magnetic material is biased, so to say, and drawn into saturation, so that no signaling
15 occurs anymore at the gates at the exit. By demagnetizing the hard-magnetic material again upon return of the borrowed objects, the respective label can be made active again.

To afford the personnel an opportunity to provide better service to the library visitors, for instance to provide assistance in finding books or in
20 operating, for instance, an Internet computer, it would be of great interest if the materials to be borrowed could be checked out by the borrowers themselves.

Especially lending out CDs is a laborious operation because CDs cannot always be provided with an antitheft label. In such cases, the CDs
25 are stored separately from the boxes, or a so-called CD-safer is employed, in which the CD is stored with box and all and is subsequently locked with a lock. In the former case, the respective CD matching the box must be found again, and in the latter case the CD-safer must be removed and stored.

The present invention aims to provide a solution to all these problems and will be described in the following, with reference to a few drawings.

Fig. 1 shows a CD box as used in the library system according to the invention.

Fig. 2 shows a double CD box as used in the library system according to the invention.

To make it easier for the borrower to scan both the library pass and the objects to be borrowed, in the library system according to the invention, instead of utilizing a barcode, use is made of a non-contact electromagnetic radiofrequency identification label, as described in applicant's Dutch patent No. 176404, or a label based on the same principle, having a higher operating frequency, for instance 13.56 MHz as described in the international standard ISO 15693. The labels according to this standard are provided with a so-called multi-label protocol, which makes it possible for several labels in the field to be read and/or programmed in succession. Because these non-contact electronic identification labels are programmable, so that they can contain information which can be activated and deactivated, and also have a relatively great readout distance, the antitheft function can also be taken over by these labels. This last is done with the aid of an antitheft system disposed at the exit of the library, which system, via the same non-contact electromagnetic radiofrequency communication medium, is activated or not, depending on whether check-out is incorrect or correct.

The non-contact electronic identification label is provided in or on all objects to be lent, such as, for instance, books and CDs, and can contain, in addition to an identification number for the object, other information, such as, for instance, dimensions of the object, weight, location, genre, summary, impression, lending period, library, date of purchase, and logistic information for the purpose of the production process.

To enable a simple check-out terminal, preferably the library pass is also provided with the same non-contact electromagnetic radiofrequency identification label, which can be read and/or programmed with the same transmitter/receiver as that used for reading and/or programming the object
5 to be borrowed. In that case, advantageously, use can be made of the above-described multi-label protocol, so that the library pass together with the objects to be borrowed can be concurrently read out in succession in the field and optionally be written.

With the aid of the check-out terminal, one or more objects to be
10 borrowed can be coupled to a library pass by passing the identification codes of all objects to be borrowed, as well as the identification code(s) of the library pass, to a library computer. The library computer records this coupling and via the library computer these couplings can be modified.

A borrower can be identified not only by way of the library pass, but
15 also on the basis of biometric features, such as, for instance, a fingerprint.

In order to simplify the operations for borrowing CDs, in the library system according to the invention, preferably use is made of a special CD box, which is lockable and which takes the place of the normal box in which the CD was packaged when purchased. This lockable box, which is depicted
20 in Fig. 1, has the same dimensions as a standard CD box, so that it fits into storage systems intended therefor. The CD box is provided with the same type of non-contact electromagnetic radiofrequency identification label as described above and which is also provided in the books. This label is provided in the box at a position which is not covered, and hence screened,
25 by the metallized CD, so that the identification and the antitheft function continue to function and are not limited in performance by the CD. Due to the fact that this label is not provided on the CD disk itself, it is possible to separate the disk and the box and to exchange either of them, which can be obviated by providing a non-contact electromagnetic radiofrequency

identification label not only in the box but also around the opening of the disk at a position suitable therefor in connection with the CD player.

Due to the metal layer on the CD, this label will to some extent be screened and it will not be possible to read out this label at a large distance.

5 However, this label, which is provided on the CD itself, can be read out at the check-out terminal and the check-in terminal where, before the box is locked or unlocked, it can also be determined whether the correct CD is in the correct box or has possibly got lost.

The lockable CD box consists, as depicted in Fig. 1, of a hinged lid
10 (1) attached to an outer box (2) in which a slidable CD carrier (3) can move back and forth, being capable of taking two positions under the influence of a spring (4) and two pawls (5, 6). In the position which is locked by the pawls (5, 6), the CD box can be opened, and in the other position, in which the spring (4) relaxes to some extent, the CD box is locked in that a number
15 of projections (7), which are provided on the slidable CD carrier (3) around the CD, ensure that, corresponding with these projections (7), corresponding projections (8) on the hinged lid (1) and corresponding projections (9) on the outer box (2) are locked, so that the hinged lid (1) cannot be opened anymore. The above-described lockable CD box has the same dimensions as
20 a standard CD box and can be provided with the same promotional material, such as a printed inlay sheet under the slidable CD carrier or a booklet with, for instance, lyrics, behind the projections (10) in the hinged lid (1).

Also a so-called double CD, with two, instead of one, CDs disposed in
25 the box, can be fitted with the same locking mechanism, as shown in Fig. 2, with the slidable CD carrier (3) being also hingedly fitted in the outer box (2). The pawls (5, 6) in this case are attached to an additional sliding part (11), in which also the slidable CD carrier (3) hinges on the pivots (12, 13).

The locking of the lockable CD box is done with the aid of two strong
30 magnets (14, 15) which unlatch the pawls (5, 6), so that the slidable CD

carrier (3), under the influence of spring (4), slides into the locking position. In this locking position, the pawls (5, 6) enter into engagement again with the projections (16, 17) corresponding with these pawls, so that the lockable CD box cannot, for instance by striking the rear side, be opened again.

5 When opening the lockable CD box, the pawls (5, 6) are uncoupled from the projections (16, 17) again with the aid of the two magnets (14, 15), and also with the aid of the two magnets (14, 15), via the pawls (5, 6), the slidable CD carrier (3) is pulled, against the action of spring (4), back into the unlocked position again.

10 The two strong magnets (14, 15) can be arranged under an unlocking position on the check-out terminal and, for instance via an electric motor, be driven at the time when in the computer the lockable CD box has been coupled as a borrowed object to a library pass.

15 For activating and deactivating the antitheft function in the label, in the library system according to the invention, a special memory location, which can consist of just one bit of information, in the non-contact electromagnetic identification label is written or erased. Depending on the contents of this memory location, at the exit of the library, an alarm signal is generated, or is not, to thereby prevent objects to be borrowed from being
20 taken out without having been checked out by the borrower via the check-out terminal.

 To arrange for the borrower to see when the borrowed objects are to be returned to the library, it is possible, as is usual, but optional, at the check-out terminal to print a slip with the respective date, alone or together
25 with the titles of the objects borrowed.

 An environmentally more friendly method is the use of a, for instance thermally, reprintable layer on the library pass, which can each time be erased and reprinted again, so that the borrowed objects can be specified on the library pass. The number of printable lines on the library
30 pass then naturally constitutes a limitation, which can be obviated by

indicating the remaining number of items in the last line. In view of the average amount of borrowed objects, however, this will be necessary only for a very limited group of borrowers. Cards with reprintable layers are state of the art and are offered by various suppliers. In addition to the number of
5 borrowed objects, it is also possible to record the name, address, place of residence, validity, biometric information, a member's current credit balance or a deficit, on the library pass and/or in the identification label.

By fitting the labels in the books and other lending objects at corresponding positions, and by the possibility of successively reading out
10 several labels concurrently present in the field of the transmitter/receiver, the library system according to the invention provides the possibility of making an inventory of all objects in the library in a simple manner, or to determine that objects are located in a wrong location. Use can be made here of a portable hand-held transmitter/receiver with a datalog function, or
15 a transmitter/receiver which, for instance with the aid of a radio connection, is wirelessly connected with the library computer.

When being returned, the borrowed objects are again read out contactlessly, for the date and optionally the time to be recorded. This can be done in the library by the borrower on a check-in terminal, which has the
20 same functionality as the check-out terminal. The CD boxes are thereby locked again and the antitheft function of the non-contact electronic labels connected with the objects, is activated again. Also, the reprintable text on the library pass can be modified, whereby the returned objects are removed from the library pass.

25 The check-in function can also be automated, for instance by returning the objects via a letterbox provided with a transmitter/receiver, with which the non-contact electronic labels are read and with which, after registration of the borrowed objects, the antitheft function is activated again. Also, the CD boxes may thereby be locked again with the aid of
30 magnets in the above-described manner. Of course, the automatic check-in

terminal can also be provided with a printer to erase the library pass or to reprint it with up-to-date information.

CLAIMS

1. A library system arranged for borrowers themselves to check out objects to be borrowed, such as books and CDs, characterized in that the objects to be borrowed are provided with a non-contact electromagnetically readable radiofrequency identification label, in which, in addition to an identification number of the object,
5 information which can be activated and deactivated is stored for the purpose of an antitheft function, in order for an antitheft system arranged at the exit of the library to be activated, or not, via the same non-contact electromagnetic radiofrequency communication medium,
10 depending on incorrect or correct check-out.
2. A library system according to the preceding claim, characterized in that also the library pass is provided with the same type of non-contact electromagnetic radiofrequency identification label, which can be read
15 and/or programmed with the aid of the same transmitter/receiver(s) as used for reading and/or programming the objects to be borrowed.
3. A library system according to one or both preceding claims,
20 characterized in that the non-contact electromagnetic radiofrequency identification labels are provided with a multilabel protocol, so that several labels simultaneously present in the field can be successively read and optionally can be programmed.
4. A library system according to one or more of the preceding claims,
25 characterized in that the library pass is provided with a reprintable layer, which can each time be erased and reprinted, so that current information about the borrowed objects or the number of borrowed

items, optionally together with a borrower's balance credit or deficit,
can be specified on the library pass.

5. A library system according to one or more of the preceding claims,
5 characterized in that the boxes for CDs are provided, outside the
position of the CD, with the same type of non-contact electromagnetic
radiofrequency identification label, so that also the antitheft function
is taken care of, so that this label is not screened off by the metallized
CD and the antitheft function is not limited in performance.
10
6. A library system according to one or more of the preceding claims,
characterized in that the CD boxes used are lockable and also have the
same dimensions as the current boxes, so that they fit into storage
systems intended therefor.
15
7. A library system according to one or more of the preceding claims,
characterized in that the CD in the CD box, at a position suitable
therefor in connection with the CD player, is provided with the same
type of non-contact electromagnetic radiofrequency identification label,
20 thereby preventing disks and boxes being exchanged or getting lost.
8. A library system according to one or more of the preceding claims,
characterized in that the CD boxes used are lockable, but also have the
same outer dimensions as the current boxes and are further suitable
25 for storing two CDs.
9. A library system according to one or more of the preceding claims,
characterized in that prior to locking the CD box, it is determined if
the correct CD(s) is/are in the box.
30

10. A library system according to one or more of the preceding claims,
characterized in that the CD boxes used are lockable and are provided
with a magnetically operated locking mechanism.
- 5 11. A library system according to one or more of the preceding claims,
characterized in that the CDs used are so designed that they can
contain the same promotional materials for the CDs stored in the boxes
as the promotional materials that are present in the non-lockable CD
boxes originally used for the respective CDs.
- 10 12. A library system according to one or more of the preceding claims,
characterized in that via a check-out terminal one or more objects to be
borrowed can be coupled to a library pass by passing the identification
code(s) of all objects to be borrowed, as well as the identification code(s)
15 of the library pass to a library computer, which records and updates
this coupling.
13. A library system according to one or more of the preceding claims,
characterized in that via a check-out terminal, after the coupling of the
20 objects to be borrowed to a library pass, the antitheft function of the
non-contact electromagnetic radiofrequency identification label fitted
per object is deactivated.
14. A library system according to one or more of the preceding claims,
25 characterized in that via a check-out terminal provided with a
magnetic unlocking mechanism, after coupling a CD to be borrowed in
a lockable CD box is unlocked with the aid of one or more magnetic
fields.

15. A library system according to one or more of the preceding claims,
characterized in that via a check-out terminal, after the coupling of the
objects to be borrowed, by means of a printer equipped for that
purpose, the reprintable information on a library pass is updated.
- 5
- 16 A library system according to one or more of the preceding claims,
characterized in that via a check-in terminal, which may or may not be
automatic, one or more objects to be borrowed can be uncoupled from a
library pass, by passing the identification code(s) of all objects to be
10 borrowed, as well as the identification code(s) of the library pass, to a
library computer, which provides for this uncoupling.
17. A library system according to one or more of the preceding claims,
characterized in that via a check-in terminal, which may or may not be
15 automatic, after the uncoupling of borrowed objects from a library
pass, the antitheft function of the non-contact electromagnetic
radiofrequency identification label fitted per object is activated.
18. A library system according to one or more of the preceding claims,
20 characterized in that via a check-in terminal, which may or may not be
automatic, provided with a magnetic locking mechanism, after
uncoupling a borrowed CD is locked in a lockable CD box by means of
one or more magnetic fields.
- 25 19. A library system according to one or more of the preceding claims,
characterized in that via a check-in terminal which may or may not be
automatic, after uncoupling of the borrowed objects, with the aid of a
printer equipped for that purpose, the reprintable information on a
library pass is updated.

20. A library system according to one or more of the preceding claims, characterized in that an automatic check-in terminal is activated by returning borrowed objects via a letterbox intended for this purpose.

5 21. A library system according to one or more of the preceding claims, characterized in that the identification of the borrower, besides proceeding, or instead of proceeding, via the library pass, occurs on the basis of biometric features, such as, for instance, a fingerprint.

10 22. A library system according to one or more of the preceding claims, characterized in that a portable hand-held transmitter/receiver is used for making an inventory of the objects present in the library and/or for tracing objects placed in wrong locations, which is provided with a datalog function.

15 23. A library system according to one or more of the preceding claims, characterized in that a portable hand-held transmitter/receiver is used for making the inventory of the objects present in the library and/or for tracing objects placed in wrong locations, which is provided with a
20 radio communication facility to communicate directly with the library computer.

24. A library system according to one or more of the preceding claims, characterized in that the non-contact electromagnetic radiofrequency
25 identification labels connected with the objects contain, besides an identification number, additional information, such as, for instance, dimensions, weight, location, genre, summary, impression, lending period, library, date of purchase, and logistic information for the purpose of the production process.

30

25. A library system according to one or more of the preceding claims,
characterized in that the non-contact electromagnetic radiofrequency
identification labels connected with the library passes contain, besides
an identification number, additional information, such as, for instance,
5 name, address, place of residence, balance, validity and biometric
information.

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