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## (54) Electronic article surveilance system and method

(57) An electronic shoplifting detection system, provided with a number of electronic labels, wherein the system is provided with first detection means to detect the presence of an electronic label in at least one detection zone to be passed by, for instance, persons, wherein the detection zone can be passed in at least one first and one second passage direction, wherein the detection system is arranged to produce an alarm upon detection of an electronic label, wherein the detection system is provided with second detection means which are arranged to determine in which passage direction the persons and/or electronic labels pass the at least one detection zone, wherein the detection system is further provided with data processing means arranged to couple a detection of an electronic label to a determined passage direction for distinguishing a label detection when said detection zone has been passed in the first passage direction and a label detection when said detection zone has been passed in the second passage direction.

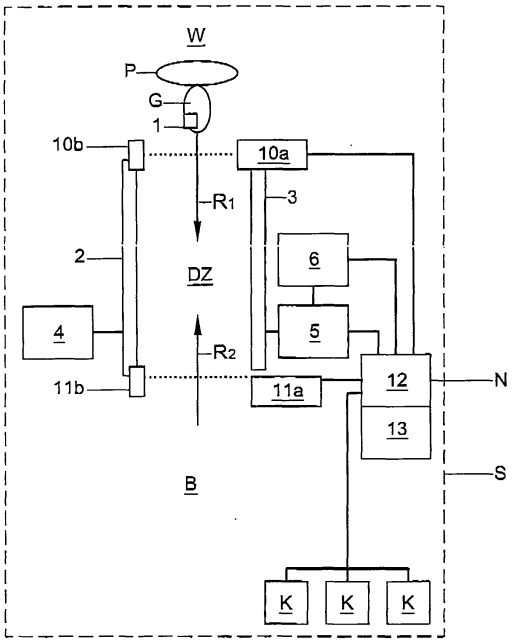


Fig. 1

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## Description

**[0001]** The invention relates to an electronic shoplifting detection system, provided with a number of electronic labels which are operatively attached to articles to be secured, wherein the system is provided with first detection means to detect the presence of an electronic label in at least one detection zone to be passed by, for instance, persons and/or articles, wherein the detection system is arranged to produce an alarm upon detection of an electronic label in the detection zone, wherein the detection zone can be passed in at least one first and one second passage direction. Such a system is known from practice. The first detection means of the known system comprises one or more detection gates, which have, for instance, been set up at one or more exits and/or passages of one or more stores to be secured. When a person attempts to pass the first detection means with articles provided with one or more active electronic labels, for instance unpaid-for articles, these labels are detected by the first detection means, so that an alarm connected to the detection means goes off.

**[0002]** When articles have been bought by a customer, the labels of the articles need to be removed and/or to be deactivated by the store staff. The customer can then leave the store with the articles, while he can to pass the first detection means without an alarm connected to the detection means going off.

**[0003]** In practice, often false or undesired alarms are produced. False alarms are alarms while no label is present. Undesired alarms are alarms with respect to detection of electronic labels of legitimately obtained articles.

**[0004]** In a first case, an undesired alarm appears to be produced when an article has correctly been paid for by a customer, while store staff have forgotten to deactivate or to remove the theft prevention label attached to the article.

**[0005]** In a second case, (often) an undesired alarm appears to be produced when articles provided with electronic labels are for instance introduced into a store from the outside along first detection means. These may, for instance, be articles legitimately obtained in the same and/or another store, where it was accidentally forgotten by the store staff to deactivate and/or to remove the associated electronic labels. For instance, after an undesired alarm as described for the first case, the store staff tend to forget to still remove or deactivate the label which caused an undesired alarm. The label can then again cause an undesired alarm in the same store or in another store at a later time.

**[0006]** These undesired alarms can embarrass a customer and are therefore customer-unfriendly. In addition, the effectiveness of the known system is disturbed in that the system relatively often produces an undesired alarm. In each case, the store staff loses relatively much time to react to the undesired alarm, which is undesired from an economic point of view and for security reasons.

**[0007]** For the management of, for instance, a store, it is further relatively difficult to get a good picture of the cause of the alarm of the theft detection system (possibly undesirably) going off. This holds particularly true for the management of a store chain or the like, where articles can be bought at various locations, which articles are secured by means of the same type of electronic labels. Therefore an effective prevention of undesired alarms, for instance by managing the store staff, is relatively difficult for the management.

**[0008]** The present invention contemplates an improvement of the electronic theft detection system. In particular, the invention contemplates a theft detection system with which the number of undesired alarms can be reduced.

**[0009]** To this end, the system according to the invention is characterized by the measures of claim 1.

**[0010]** The system according to the invention is provided with second detection means arranged to determine in which passage direction the persons and/or labels and/or articles to or in which the labels have been attached pass the at least one detection zone, while the detection system is further provided with data processing means arranged to couple a detection of an electronic label made by the first detection means to a passage direction determined by the second detection means for distinguishing between an alarm after a label detection when the detection zone has been passed in one determined passage direction, in particular a direction from an environment into a store, and an alarm after a label detection when the detection zone has been passed in one different determined passage direction, in particular in a direction out of the store. In use, the second detection means can determine in which direction persons, articles and/or electronic labels pass the at least one detection zone. In addition, the first detection means can detect whether an electronic label is present in the detection zone. Then, the first detection means can generate, for instance, a detection signal or alarm, for instance in the form of an audible signal, visible signal or electric signal for further processing. The data processing means couple a detection of an electronic label made by the first detection means to a passage direction determined by the second detection means. Thus, the system can distinguish whether the articles provided with a label and carried by a person leave or, conversely, enter a store. Thus, the system can distinguish an alarm after a detection of a label leaving the store from an alarm after a detection of a label entering the store. The first case may point to theft of an article or to an article which has been paid for but whose label has not been removed or deactivated. The system can then, for instance, be arranged to generate an audible alarm after which the staff can investigate the cause of the alarm. The customer can then, for instance, still pay or the label can be removed or deactivated when it turns out that the customer has paid already. Conversely, in most cases, the second case is an indication that there is no theft. In that case, for

instance only a silent alarm can be produced for the store staff who can then approach the customer in a discrete manner to investigate what the cause of the undesired alarm is.

**[0011]** Preferably, the detection results of the first and second detection means are coupled and, for instance, centrally processed and stored. With this label detection information, the management of a relevant store can get a good picture of the different causes underlying alarm generated by the theft detection system. If it is found, for instance, that the alarm often goes off because articles are introduced into a store from an environment, the cause of the alarm is not the staff of the relevant store, but probably the staff of one or more other, for instance nearby, stores. On the basis of the label detection information, the management can take action aimed at the staff to reduce undesired theft alarm. However, if it is found that the alarm often goes off if a label leaves the store while there is no theft, the staff can no longer plead as an excuse that these are false alarms resulting from labels which are introduced into the store. Moreover, the system provided by the invention increase customer-friendliness, while the effectiveness of the system can be maintained well or can even be increased.

**[0012]** It is further possible to store the data of correctly checked out articles. This can be done by reading out an identification code of the label coupled to an article at a checkout unit. If it is then found that still an alarm goes off upon leaving the store (that the store is left appears from the data coming from the second detection means), it can then (automatically) be determined that this is apparently a label which has not been deactivated or removed by the staff of the store.

**[0013]** The invention further relates to a data processing system, which system is provided with at least one detection system.

**[0014]** Such a data processing system is known per se from international patent application WO 01/27892 in the name of applicant, which international patent application is considered to be incorporated in the present application by reference.

**[0015]** According to the present invention, the data processing system is characterized by the measures of claim 21.

**[0016]** In this manner, through the information collection device, the management can obtain remote access to information concerning the numbers of theft alarm and the types of theft alarm occurring in a particular time span. The information comprises at least information about detected antitheft labels and associated passage directions, so that it can be distinguished well in which direction an alarm-generating label, in particular a person or article carrying the label, has passed a detection zone. The information may further comprise, for instance, the time, date and the localization of the relevant detection zone or the like. With the aid of the data processing system, weak spots in the security of the store or a store chain can be localized well. In addition, the system can be used to call store staff to account still more specifically with respect to the removal or deactivation of electronic labels. Further - as part of loss prevention - causes of alarms and security incidents can be discovered well with this system. The occurrence of undesired alarms can be reduced well and effectively with this system.

**[0017]** The invention further provides a method characterized by the measures of claim 24. This method offers above-mentioned advantages. With this method, different types of alarm, whether false or not, can be distinguished from one another particularly well.

**[0018]** The invention further provides a use of a detection system according to any one of claims 1-19 and/or a data processing system according to any one of claims 21-23 for detecting electronic labels and associated detection zone passage directions.

**[0019]** Further elaborations of the invention are described in the subclaims. The invention will now be explained on the basis of an exemplary embodiment and with reference to the drawing, in which:

Fig. 1 schematically shows a top plan view of a first exemplary embodiment of a theft detection system according to the invention;
Fig. 2 schematically shows a data processing system according to the invention; and
Fig. 3 schematically shows a top plan view of a second exemplary embodiment of a theft detection system according to the invention.

**[0020]** Fig. 1 shows an electronic theft detection system S, for instance for use in one or more stores. The system is provided with electronic labels 1 which are operatively attached to articles G to be secured. This means that the labels can be provided both on an outside of an article or inside an article. In particular, the labels 1 are provided with article identification codes for identification of the associated article s. Such labels 1 are known per se from practice and serve to identify an article G when the article G is checked out at a checkout K. This is also referred to as RFID. Such labels comprise an identification code which can, for instance, be read out with the aid of an electromagnetic interrogation field. However, it is also possible that the labels do not comprise an identification code. In that case, only the presence of a label in a detection zone is detected.

**[0021]** The system comprises first detection means 2-5 to detect the presence of electronic labels 1 in at least one detection zone DZ to be passed by persons P. Such first detection means 2-5 are known per se from practice, see for instance European patent EP 0 736 850. In particular, an optional identification code of a label in the detection zone is read out. These detection means particularly comprise at least one antenna 2 and a transmitter 4 to form an electromagnetic interrogation field. In addition, the detection system comprises an antenna 3 with a receiver 5 to detect the response of a label 1 in the interrogation field. Here, the detection means may, for

instance, be designed as an emission system or an adsorption system. Upon detection of a label, the receiver generates a detection signal. The system further comprises an alarm device 6 coupled to the receiver 5 to produce an alarm upon detection of a label 1 in the detection zone DZ. The system may, for instance, comprise one or more theft detection gates, which gates are each arranged to lead persons P through an associated detection zone DZ. Each detection gate may be provided with, for instance, at least the antennas 2, 3 for the purpose of detection of labels 1. Preferably, the first detection means 2-5 are arranged to automatically read out the article identification codes upon detecting electronic labels 1 in the detection zone DZ. It will be clear that it is generally desired that a label going from the store through the detection zone DZ to an environment is detectable in that the label is activated.

**[0022]** In this example, the theft detection system S is designed such that persons P can only pass the detection zone DZ in particular directions, for instance in a first passage direction R1 from a store W to an environment B and a second, opposite passage direction R2. It will be clear that the detection zone DZ, and optionally thus the antennas 2, 3 and the detection gates, may, for instance, be positioned near an entrance and/or exit of the store W, as shown in Fig. 1. In Fig. 1, a person P is shown, which enters the detection zone DZ in a passage direction indicated by arrow R1. The person P carries an article G, which article G is provided with an electronic label 1.

**[0023]** In Fig. 1, the detection system S is provided with one detection zone. It goes without saying that the detection system S may also be provided with more than one such detection zone DZ. Further, the detection system S is preferably provided with at least one identification code with which the detection system D and/or each detection zone DZ of the detection system S is identifiable.

**[0024]** The detection system S is provided with second detection means 9 arranged to determine in which passage direction persons P pass the at least one detection zone. In the present exemplary embodiment, these second detection means 9 comprise two sensors 10a, 11a which are, at least viewed in a passage direction of the detection zone DZ, disposed separately from each other. The one sensor 10a is disposed near a first side of the detection zone DZ - viewed in the top plan view of Fig. 1 - while the second sensor 11a is located on an opposite second side. The sensors 10a, 11a are preferably integrated in the first detection means, for instance when the sensors have been provided on and/or in a housing of the antennas 2, 3, in particular the theft detection gate. In addition, the sensors 10a, 11a may, for instance, be disposed elsewhere. In the present exemplary embodiment, the sensors 10a, 11a are optical sensors arranged to detect infrared light beam shown by dotted lines, which, for instance, come from opposite infrared light sources 10b, 11b.

**[0025]** It will be clear to a skilled person that the second detection means 10, 11 may be designed in various different manners, and may comprise, for instance, pressure sensors, acoustic sensors, electromagnetic sensors, movement sensors, biometric sensors, cameras and/or the like.

**[0026]** As Fig. 1 shows, the first and second sensor 10a, 11a are disposed such that a person P (or an article carrying the label) which has passed the detection zone DZ is successively detected by both sensors 10a, 11a, for instance because both beams are successively interrupted by the person or the article. Here, from the order of detection, it can simply be determined in which passage direction R1, R2 the detection zone DZ has been passed by the person P (or the article). If the person or the article has first been detected by the sensor 10a and then by the sensor 11a, the passage direction will be R1. If the person or the article has first been detected by the sensor 11a and then by the sensor 10a, then the passage direction will be R2.

**[0027]** Alternatively, the sensors 11a, 11a of the second detection means 9 may, for instance, be used to determine from which side a person P (or the article) enters the detection zone DZ with a label 1, while the electronic label 1 is then detected by the first detection means 2 in the detection zone DZ. Conversely, the sensors 10a, 11a may, for instance, be used to determine on which side the person P (or the article) leaves the detection zone DZ after detection of the label 1 in the detection zone DZ. In each case, the first detection means 2-5 can then simply be used in combination with the sensors 10a, 11a to determine the passage direction R of the relevant person P (or article). Then, together with the sensors 10a, 11a, the first detection means 2 form the second detection means 9.

**[0028]** Also, one of the sensors can be omitted, for instance the sensor 11a. If the first detection means 2 detect a label, it can be checked whether a person or article carrying the label will pass the sensor 10a right afterwards. If this is the case, then the passage direction R2 is known, for instance into the store W. If the sensor 10a then detects nothing, then apparently the opposite passage direction R1 is involved, for instance out of the store, going outside B. The latter can be verified by checking whether right before the label is registered by the first detection means, the second sensor 10a has detected a passing person or article. Then the information coming from the second sensor 10a needs to be saved and/or stored in the system for at least a short time with, for instance, an associated time indication.

**[0029]** A combination of one or more of the possibilities mentioned in this application for detection of passage directions R1, R2 of persons P and/or labels 1 is also possible.

**[0030]** It preferably holds true that the second detection means determine the passage direction when the first detection means detect one of the labels. It may also be the case that the second detection means always determine the passage direction but that this passage di-

rection is only processed further by the system when also a label is detected in the detection zone.

**[0031]** For the purpose of determining the passage direction R1, R2, the exemplary embodiment is provided with a data processor 12, which is coupled to the second detection means 10a, 11a. This data processor 12 may, for instance, comprise a control, electronics, a computer, a memory, calculation means, software and/or the like. The data processor 12 is preferably designed to process and preferably store at least each passage direction R1, R2 determined by the second detection means 9.

**[0032]** In addition, the data processor 12 is coupled to the first detection means 2-5. The data processor 12 is arranged to couple a detection of an electronic label 1 made by the first detection means 2-5 to a passage direction R1, R2 determined by the second detection means 9. Further, the data processor 12 is preferably arranged to couple each passage direction determined by the second detection means 9 to the zone identification code of the detection zone DZ associated with that passage direction, in particular when the system comprises several detection zones DZ. Coupling these data can be done in different manners, for instance by processing the data in tables or the like.

**[0033]** Further, the data processor 12 may, for instance, be coupled to an article check-out system for the purpose of checking out articles G, for instance a system comprising one or more checkouts K. The check-out system may, for instance, be arranged to automatically store payment information, at least information concerning the articles G which have been paid for. To this end, for checking out, the labels need to be scanned by, for instance, a scanning device of a checkout K. Here, for instance an article identification code of a label may be read out. Further, the check-out system may, for instance, be arranged to store information concerning staffing of the checkouts K. Then the data processor 12 is preferably arranged to cooperate with the check-out system, to determine whether an article G of a label 1 detected in a detection zone DZ has already been paid for, and, for instance, to determine by which staff member and/or at which checkout K the article G has been checked out. Here, it for instance holds true that the article check-out system is arranged to read out the readable article identification code of a label associated with an article which is or has been paid for, that the first detection means read out the article identification code in the detection zone and that the data processing means determine whether an article identification code read out in the detection zone had also been read out by the article check-out system.

**[0034]** Preferably, the data processor 12 is also coupled to the alarm device 6 to control the alarm device 6. The data processor 12 can then, for instance, control the alarm device 6 such that, in the store, a signal observable by the customer is generated when a label is detected while this label now just leaves the store. The going off of the alarm device 6 can then, for instance, automatically be suppressed by the data processor 12 when it appears that a person P or article G enters a store via the detection zone DZ, and/or when it follows from an article identification code read out in the detection zone DZ that the relevant article G has already been paid for. In that case, the data processor 12 can also control the alarm device 6 such that, for instance, the alarm device 6 does generate an alarm which is not detectable by the customer but can be detected by the store staff so that they can approach the customer discretely to still deactivate or remove the label 1.

**[0035]** More generally, it holds true that the system is arranged to produce a first type of alarm after a label detection when the detection zone (DZ) has been passed in one determined passage direction, in particular a direction R2 from an environment B into a store W and to produce a second type of alarm after a label detection when the detection zone (DZ) has been passed in one other determined passage direction, in particular a direction R1 out of a store. Here, for instance, the first type of alarm may be an alarm which is not observable by the customer and the second type of alarm may be an alarm which is observable by the customer. It will be clear that, in this example, the first and the second type of alarm mutually differ. In this case, it is, for instance, possible to distinguish an alarm which is generated when a label 1 is detected which leaves the store W from an alarm which is generated when a label 1 enters the store W.

**[0036]** Preferably, the data processor 12 is arranged to centrally store label detection information, at least information comprising that a label has be en detected (for instance further comprising an associated article identification code), an associated passage direction R1, R2 and, for instance, also the identification code of the associated detection zone DZ and/or the detection system S. The data processor 12 is, for instance, arranged to transmit such label detection information to at least one information collection device C shown in Fig. 2. The information can be stored in, for instance, at least one computer memory and/or on at least one data carrier of, for instance, the data processor 12 or the device C.

**[0037]** For the purpose of transmitting the information, the detection system S is preferably couplable or coupled to at least one communication network N, for instance a computer network, telephone network, store communication network and/or the like, as shown in Fig. 2. The data processor 12 may, for instance, be arranged to communicate with the information collection device C through the network N. These communication means, at least the data processor 12 and the network N, may, for instance, be arranged to transmit the information to the information collection device C in real time. These communication means 12, N may, for instance, also be arranged to store the information for a particular period, and to subsequently transmit the information to the information collection device C.

**[0038]** The label detection information may, for instance, also be stored in one or more computer memories

and/or on one or more writable data carriers by the data processing device 12, for instance for keeping that information and/or for further processing. Further, this label detection information may comprise various other data, for instance information with respect to time and date of each alarm, the location of a relevant detection zone, the location of the relevant store or the like.

**[0039]** The exemplary embodiment is further provided with monitoring means 13 to monitor a detected passage direction R1, R2, for instance during or after a label detection, and under the influence of a label detection by the first detection means 2-5. The monitoring means are, for instance, coupled to the data processing device 12, or form a part of the data processing device 12. Such monitoring means 13 may, for instance, comprise a display, lamp, sound-generating means and/or the like. In addition, the alarming means 6 and the monitoring means may, for instance, be integrated with each other or the like.

**[0040]** During use of the system shown in Fig. 1, the presence of each active electronic label 1 is detected by the first detection means 2-5 in detection zone DZ. Further, an article identification code of the label 1 is read out, if the label is provided therewith. In addition, with the aid of the sensors 10a, 11a, it is determined in which direction R a person P, carrying the label 1, passes the detection zone DZ. If the detection system S detects that a person P leaves a store through a detection zone DZ with unpaid-for articles G, which could point to theft, the alarm 6 goes off automatically. It will be clear that the detection zone DZ may, for instance, be positioned near an exit of the store W.

**[0041]** The alarm may also, for instance, go off when a person P enters the store with a (non-deactivated) label 1. The measured passage direction can then be indicated by monitoring means 13 of the data processor 12. Thus, store and/or security staff know immediately after the alarm whether the person P entered or left the store. Particularly an undesired alarm, which can arise when a label 1 is introduced into a store from an environment, can thus be solved quickly. It will be clear that it is generally not desirable that a label which enters the store from the environment is detectable because the label has not been deactivated.

**[0042]** On the other hand, the going off of the alarm device 6 can, for instance, be suppressed by the data processor 12 when it appears that the person entered the store through the detection zone DZ. It is therefore possible to distinguish between an alarm after a label detection when the detection zone (DZ) has been passed in one determined passage direction, in particular a direction from an environment (B) into a store (W) and an alarm after a label detection when the detection zone (DZ) has been passed in one other determined passage direction, in particular in a direction out of the store (W). It will be clear that the detection zone DZ may, for instance, be positioned near an entrance of the store W. As a result, action of store staff can be prevented when labels 1 are introduced from an environment through the detection zone DZ into a store and/or the customer is prevented from being innocently embarrassed. In this case, for instance still a silent alarm or the like can be produced, for instance through the monitoring means 13, so that store staff or store management know that a label 1 has been detected in the detection zone DZ. The staff can then discretely approach the customer without the customer being embarrassed in the store. The staff can then remove or deactivate the label.

**[0043]** In addition, on the basis of payment information coming from the check-out system, the data processor 12 can use a read-out article identification code to automatically determine whether the relevant article G has already been paid for. If it turns out that the article has indeed already been paid for, this can, for instance, be indicated by the monitoring means 13, so that an alarm can quickly be dealt with. On the other hand, the going off of the alarm device 6 can, for instance, be suppressed by the data processor 12, so that action of the staff can be prevented. In the latter case, moreover, a silent alarm or the like can still be produced.

**[0044]** Each label detection, article identification code and each associated passage direction R1, R2 may, for instance, be stored in or by the data processor 12, and/or be transmitted to one or more information collection devices C. Information, stored by or in the data processing device with respect to label detections, the going off of the alarm, silent alarms, associated passage directions R and identification codes, can afterwards be used, for instance by management and/or store staff, to prevent false or undesired alarm. In particular, with this information, causes of such alarm can be traced more specifically. Moreover, by using detected article identification codes and information concerning the staffing of the checkouts K, the checkout staff who have inadvertently left the labels 1 of the paid-for articles G undisturbed can be pointed out. Analogously, it may, for instance, be determined at which checkout K the article was checked out. The data processor 12 may, for instance, be arranged to subsequently warn the relevant staff, for instance through monitoring means. In addition, the data processor 12 may, for instance, be arranged to inform the management that is has been detected by the system N that a particular staff member has forgotten to deactivate and/or remove labels 1 a particular number of times.

**[0045]** Fig. 2 shows a data processing system provided with a number of detection systems $S_1$, $S_2$ ... $S_n$. During use, the different detection systems are disposed at different locations, for instance to secure one or several stores. Each of the detection system is arranged according to the exemplary embodiment shown in Fig. 1.

**[0046]** The data processing system is provided with a central information collection device C, which device is connected to the data processors 12 of the detection systems S through communication means, for instance a communication network or computer network N. The control device C is arranged for processing the information

received through the network N.

**[0047]** During use of the system shown in Fig. 2, label detection information is transmitted from the various detection systems over the communication network N to the central information collection device C, for instance in real time or at one or more suitable moments. In the course of time, the information collection device C has, for instance, sufficient information to be able to analyze which alarm types occur with which alarm systems $S_1$-$S_n$ and/or detection zones DZ, in what amounts the different alarm types occur, which staff members and/or checkouts K were involved in the alarms and the like. On the basis of these data, it can be discovered at which locations which articles G with active labels 1 are, for instance, carried into a store, or, conversely, are carried out of the store. In addition, staff members can specifically be pointed out, particularly after using the article identification codes which are - after checking out at the checkouts K - readable in the detection zones DZ. With the results of this analysis, adequate measures can be taken by the management and/or staff. Thus, the relevant staff, who were responsible for deactivating and/or removing the labels, may for instance be urged to do better. Further, the causes of alarms and similar incidents can be established in a customer-friendly manner by use of the present system. Departures from staff procedures can be established and measures by the management can be made possible.

**[0048]** It goes without saying that the invention is not limited to the exemplary embodiment described. Various modifications are possible within the framework of the invention as set forth in the following claims.

**[0049]** Thus, the theft detection system may or may not be integrated with other systems, for instance with a system arranged to count and/or register customers, a smart EAS system or the like.

**[0050]** Further, the electronic labels (1) may operatively be attached to the articles (G) to be secured in various manners, for instance in that the labels are provided on and/or in the articles. Also, the passage direction of an article instead of a person can be determined. This may, for instance, be the case in a store when articles are involved which are relatively large.

**[0051]** The second detection means may also not be integrated with the first detection means and, for instance, be accommodated in at least one separate housing. For instance, the sensors 10a, 11a may be accommodated in one housing separated from the first detection means and the IR sources 10b and 11b may be accommodated in one housing separated from the first detection means, which housings are disposed in or near the detection zone.

**[0052]** Also, the second detection means 9 may, for instance, comprise the first detection means 2-5 (see Fig. 3). It is, for instance, possible that the system is further provided with third detection means 2'-5' which are identical to the first detection means and which detect a label in a second detection zone DZ'. The first detection zone DZ and the second detection zone DZ' are, for instance, positioned with respect to each other in a store W such that, to be able to leave the store W, a person will first pass the first detection zone DZ and will then pass the second detection zone DZ'. If such a person wants to enter the store W from outside B, however, he will first have to pass the second detection zone DZ' and then the first detection zone DZ. If such a person carries a non-deactivated label, this label will be detected by the first detection means at a first time and be detected by the third detection means at a second time. On the basis of these times, the signal processor 6 can determine the passage direction. If, in this example, the first time precedes the second time, the label will leave the store and if the first time follows the second time, the label will, conversely, enter the store. In combination, the first detection means 2-5 and the third detection means 2'-5' then form the second detection means. Further, the system can operate completely analogously to what was described with reference to Figs. 1 and 2. As described hereinabove, thus, the passage direction of the label can also be determined directly instead of the passage direction of a person or article carrying the label.

**[0053]** In the examples, persons, articles and/or labels can pass the detection zone in the first and the second passage direction. It is also possible that, besides in the first and the second passage direction, the detection zone can also be passed in a third passage direction. Here, the system can be arranged for mutually distinguishing alarms upon the passage of the detection zone in the first, the second or the third passage direction. It is also possible, for instance when the first and the third passage direction are both directions from the environment into the store and the second passage direction is a direction out of the store, that the system is designed for distinguishing alarms upon passage of the detection zone in the first or the third passage direction (into the store) from alarms upon passage of the detection zone in the second passage direction (out of the store). It is further possible that the detection zone can be passed in a fourth or further passage direction.

**[0054]** Such variants all fall within the framework of the invention.

## Claims

1. An electronic shoplifting detection system, provided with a number of electronic labels (1), which are operatively attached to articles (G) to be secured, wherein the system is provided with first detection means (2-5) to detect the presence of an electronic label (1) in at least one detection zone (DZ) to be passed by, for instance, persons (P) and/or articles, wherein the detection system is arranged to produce an alarm upon detection of an electronic label (1) in the detection zone (DZ), wherein the detection zone (DZ) can be passed in at least one first and one sec-

ond passage direction, **characterized in that** the system is further provided with second detection means (9) which are designed to determine in which passage direction (R) the persons (P) and/or the articles carrying the labels and/or the labels pass the at least one detection zone (DZ), wherein the detection system is further provided with data processing means (12) arranged to couple a detection of an electronic label (1) in the detection zone (DZ) to the determined passage direction for distinguishing an alarm upon passage in the first passage direction from an alarm upon passage in the second passage direction.

**2.** A system according to claim 1, designed to produce a first type of alarm after a label detection upon passage of said detection zone (DZ) in the first passage direction and to produce a second type of alarm after a label detection upon passage of said detection zone (DZ) in the second passage direction.

**3.** A system according to claim 2, wherein the first type of alarm is an alarm which is not observable by the customer and the second type of alarm is an alarm which is observable by the customer.

**4.** A system according to claim 3, wherein the first type of alarm is a suppressed or a silent alarm.

**5.** A system according to any one of the preceding claims, wherein the first passage direction is a direction from an environment into a store, and the second passage direction is a direction out of the store.

**6.** A system according to any one of the preceding claims, **characterized in that** the second detection means (9) determine the passage direction when the first detection means (2-5) detect one of the labels.

**7.** A system according to any one of the preceding claims, wherein the system is arranged for generating an electromagnetic interrogation field in the detection zone (DZ).

**8.** A system according to any one of the preceding claims, wherein the first and second detection means are integrated with each other.

**9.** A system according to any one of the preceding claims, wherein the first detection means are designed to generate a label detection signal when a label is detected.

**10.** A system according to any one of the preceding claims, wherein the labels are provided with article identification codes, in particular readable with the aid of an electromagnetic interrogation field, and wherein the first detection means are designed to read out the article identification codes.

**11.** A system according to any one of the preceding claims, wherein the second detection means are provided with at least two sensors (10, 11) which are, at least viewed in a passage direction of the detection zone (DZ), disposed separately from each other, wherein the sensors are each arranged for detecting a label, person and/or article.

**12.** A system according to any one of the preceding claims, wherein the data processing means (12) are designed to process and preferably store at least one passage direction determined by the second detection means (10, 11).

**13.** A system according to any one of the preceding claims, wherein each detection zone (DZ) is, at least during use, provided with a zone identification code for identification of the detection zone (DZ), wherein the data processing means (12) are designed to couple a passage direction determined by the second detection means (10, 11) to the identification code of the detection zone (DZ) associated with that passage direction.

**14.** A system according to any one of the preceding claims, wherein the data processing means (12) are arranged to centrally store label detection information concerning a label detection and an associated passage direction, and preferably at least one identification code associated with the detection system (S) and/or an associated detection zone (DZ).

**15.** A system according to claim 14, wherein the system is couplable or coupled to at least one communication network (N) to transmit label detection information concerning a label detection and an associated passage direction, and preferably also said identification code, to at least one information collection device (C).

**16.** A system according to any one of the preceding claims, provided with monitoring means (13) to monitor a detected passage direction (R), at least during or after a label detection, under the influence of a label detection by the first detection means (2-5).

**17.** A system according to any one of the preceding claims, wherein said first detection means comprise at least one theft detection gate (2, 3) which is arranged to lead persons (P) through said detection zone (DZ).

**18.** A system according to claim 17, wherein said second detection means (10, 11) have been provided on and/or in said detection gate.

**19.** A system according to any one of the preceding claims, wherein the detection zone (DZ) is positioned near an entrance and/or exit of the store (W).

**20.** A system according to claim 10, wherein the data processing means (12) are arranged to cooperate with an article check-out system, in order to determine whether an article (G) of a label (1) detected in a detection zone (DZ) has already been paid for, and preferably in order to determine which staff member has checked out the article (G), wherein, for instance, the article check-out system is arranged to read out the readable article identification code of a label associated with an article which is or has been paid for, the first detection means are arranged to read out the article identification code in the detection zone, and the data processing means are arranged to determine whether an article identification code which has been read out in the detection zone has also been read out by the article check-out system.

**21.** A system according to at least claim 10, provided with and/or couplable to a check-out system arranged to check out said articles (G) by using said article identification codes, wherein the system is arranged to produce no alarm when it follows from the article identification code of the detected label (1) that the relevant article (G) has been checked out in the check-out system.

**22.** Detection means (2-5, 10, 11), apparently intended and suitable for use in a system according to any one of the preceding claims, which detection means are at least arranged to determine in which passage direction (R) persons (P), articles (G) and/or electronic labels (1) pass the at least one label detection zone (DZ).

**23.** A data processing system provided with at least one shoplifting detection system ($S_1$, $S_2$ ... $S_n$) and in particular a plurality of shoplifting detection systems according to any one of claims 1-21, wherein each shoplifting detection system (S) is preferably provided with at least one identification code with which at least a part (DZ; S) of each detection system (S) is identifiable, wherein the data processing system is further provided with at least one information collection device (C), wherein the data processing system further comprises communication means (12, N), wherein the communication means (12, N) are at least arranged to transmit label detection information concerning detected antitheft labels and associated passage directions from each theft detection system (S) to the information collection device (C), wherein the information collection device (C) is arranged for processing the received information.

**24.** A data processing system according to claim 23, wherein said communication means (12, N) are arranged to transmit said label detection information to the information collection device (C) in real time.

**25.** A data processing system according to claim 23, wherein said communication means (12, N) are arranged to store said label detection information for a particular period, to subsequently transmit the information to the information collection device (C).

**26.** A method for preventing theft of articles from a store, wherein a number of electronic labels are attached to articles (G) to be secured, wherein the presence of an electronic label (1) is detected in at least one detection zone (DZ) for instance to be passed by persons (P), wherein an alarm is produced upon detection of an electronic label (1), wherein the detection zone (DZ) can be passed in at least one first and one second passage direction, wherein it is determined in which passage direction (R) persons (P) and/or the articles (G) carrying the labels and/or the labels (1) pass the at least one detection zone (DZ), wherein the detected presence of an electronic label (1) in the detection zone (DZ) is coupled to the determined passage direction for distinguishing an alarm upon passage in the first passage direction from an alarm upon passage in the second passage direction.

**27.** A method according to claim 26, wherein a first type of alarm is produced after a label detection upon passage of said detection zone (DZ) in the first passage direction and a second type of alarm is produced after label detection upon passage of said detection zone (DZ) in the second passage direction.

**28.** A method according to claim 27, wherein the first type of alarm is an alarm which is not observable by the customer and the second type of alarm is an alarm which is observable by the customer.

**29.** A method according to claim 28, wherein the first type of alarm is a suppressed or silent alarm.

**30.** A method according to any one of claims 26-29, wherein the first passage direction is a direction from an environment into the store, and the second passage direction is a direction out of the store.

**31.** A method according to any one of claims 26-30, wherein, in the detection zone (DZ), an electromagnetic interrogation field is generated for detecting the labels (1).

**32.** A method according to any one of claims 26-31, wherein each label detection and each associated passage direction are transmitted over at least one communication network (N) to at least one informa-

tion collection device (C), for instance in real time or in the course of time.

**33.** A method according to any one of claims 26-32, wherein each label detection and each associated passage direction are stored, for instance in at least one computer memory and/or on at least one data carrier.

**34.** A method according to any one of claims 26-33, wherein each detection zone (DZ) is coupled to an identification code with which the detection zone (DZ) is identifiable, wherein each label detection and associated passage direction (R) are coupled to the identification code of the associated detection zone (DZ).

**35.** A method according to any one of claims 26-34, wherein - for the purpose of checking out articles (G) — article identification codes of said labels (1) can be read out at one or more checkouts (K), wherein payment information, comprising the article identification codes of checked-out articles (G) and optionally staffing of said checkout (K), is stored, wherein, during the detection of a label (1) in the detection zone (DZ), the article identification code of the detected label (1) is read out, wherein, on the basis of the article identification code read out in the detection zone (DZ) and the stored payment information, it is determined whether an article (G) associated with the detected label (1) has been checked out and, if so, optionally by which staff member and/or at which checkout (K) an article (G) associated with the detected label (1) has been checked out.

**36.** Use of a detection system according to any one of claims 1-21 and/or a data processing system according to any one of claims 23-25 for detecting electronic labels (1) and associated detection zone passage directions (R).

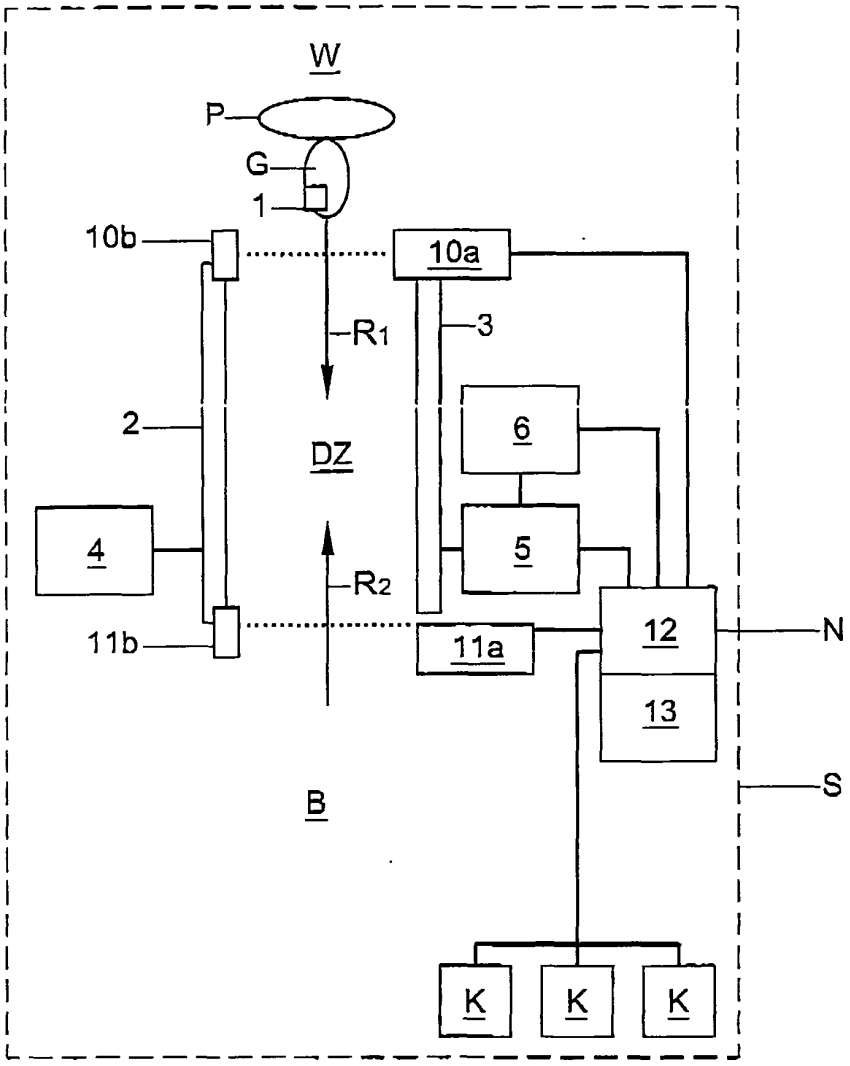


Fig. 1

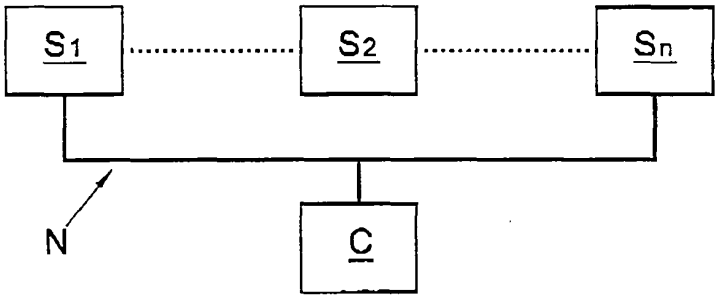


Fig. 2

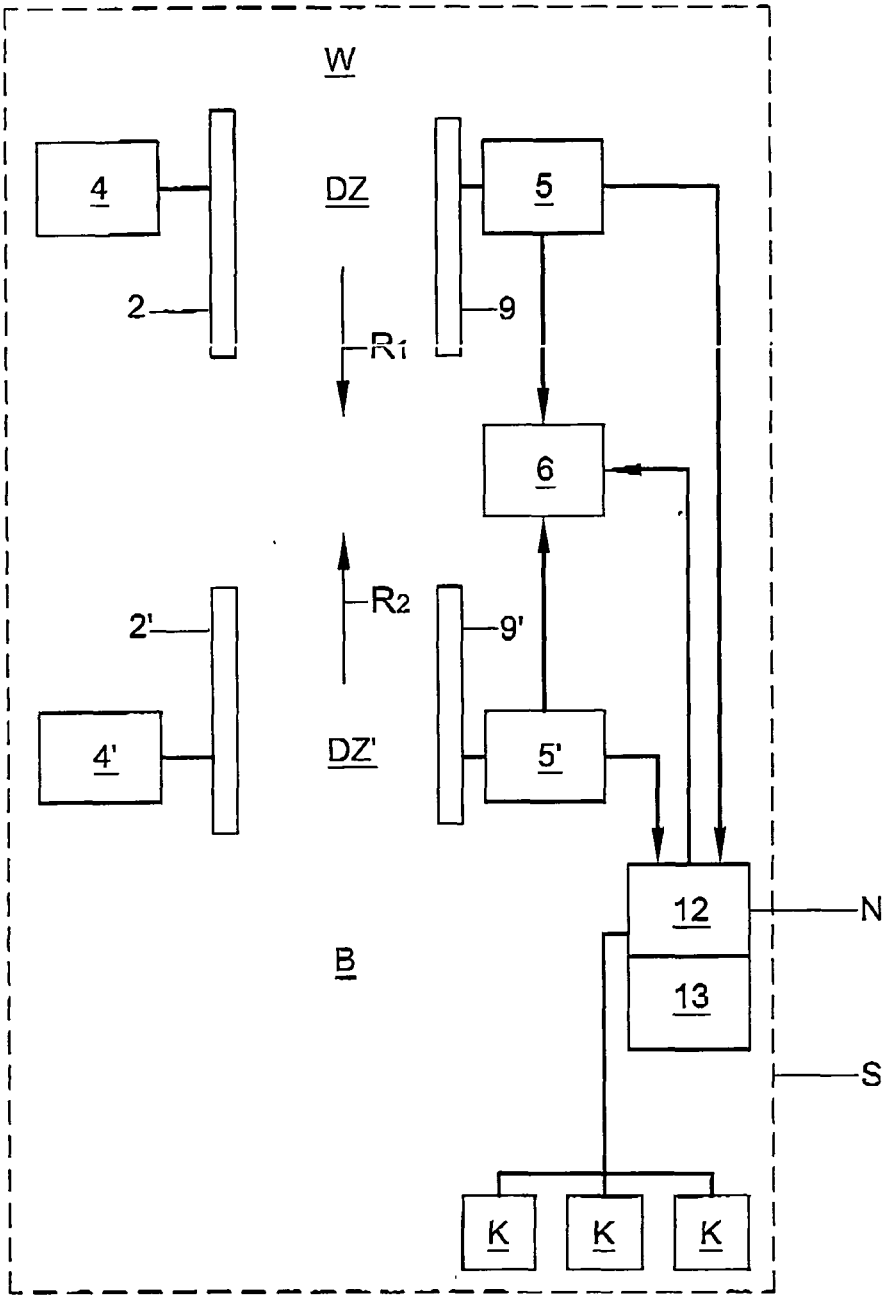


Fig. 3