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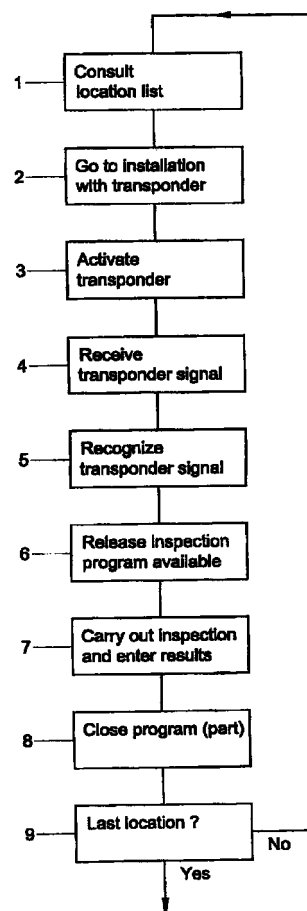
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(54) **Method and apparatus for inspecting installations or objects located at spread locations**

(57) A method for inspecting installations or objects located at spread locations, wherein the installations or objects are each provided with at least one transponder. An interrogation device carried along or otherwise transported by a person who is to inspect the installation or the object can activate a transponder when the interrogation device is located a short distance from the transponder. The data transmitted by the transponder, comprising at least a unique code identifying the installation or the object or a part thereof, are recognized. After recognition, an associated inspection protocol is made available and data relating to the inspection can be entered.



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Description

[0001] This invention relates to a method and apparatus for inspecting installations or objects located at spread locations.

[0002] Situations where installations or objects located at spread locations are to be inspected from time to time occur in various fields. To be mentioned, by way of non-limiting examples, are the management of playing apparatus, the inspection of industrial locations, management and inspection of sewer systems, checking of gas pipes or glass fiber cables at particular points, such as coupling stations, inspection of gas stations, etc.

[0003] In all of these situations, it is desirable, and sometimes even prescribed by the authorities, that periodical checks be carried out with regard to particular aspects of the installations or objects to be checked, such as, for instance, the safety, a proper functioning, etc.

[0004] In carrying out such inspections, a problem often presenting itself is that sometimes the locations to be inspected are difficult to find or are forgotten, or that reporting is insufficient. A proper uniform reporting of inspections which have been carried out, and naturally also of any repair activities, is of great importance, especially if there is a problem with an installation or object involving damage which has been caused to a third party.

[0005] The situation involving playing apparatuses will serve as an example.

[0006] The safety of playing apparatuses has always been a major point of concern because playing apparatuses are used by children, who, as is known, still have to develop a sense for recognizing dangerous situations. Children therefore run a greater risk than adults do of being victimized by apparatuses which have become unsafe in the course of time. Children may sustain injuries from such an apparatus or otherwise get into trouble.

[0007] To prevent this kind of accidents, there are a great number of regulations which playing apparatuses must satisfy. These regulations have been imposed by the government.

[0008] An important category of playing apparatuses subject to strict safety standards are found as fixed objects in parks and playgrounds. To be considered here, by way of example, are all kinds of known playing facilities, such as swings, seesaws, climbing frames, rockers, carousels, rotary barrels, etc. Such playing apparatuses are placed by a proprietor or manager and are used by children who play in that park or playground. The great majority of playing apparatuses are managed by municipal authorities, but also recreational enterprises and enterprises focusing on large-scale day tourism have relatively large numbers of playing apparatuses to be managed.

[0009] The safety risks involved in the use of such

apparatuses increase with the length of time of their being in use. Even if an apparatus has been approved 'safe' when it left the workshop, there is a risk that with the passage of time - in practice sometimes already after a few months - the safety of an apparatus has diminished considerably in that it has started to rust or in that the apparatus functions improperly or only partly, for instance when through improper use or through vandalism parts have been broken off or bent.

[0010] Bodies that manage parks and playgrounds are increasingly aware of the (financial) risks entailed in the management of these amenities. Many playing apparatuses have already been removed because safety could not be guaranteed. In addition, inspections systems for playing apparatuses are set up, whereby inspectors perform a safety check on the apparatuses present at the various locations and report on their status in a report. It has been found that the current inspection systems, in particular as regards keeping records, regularly entail problems in practice. Setting up a central administration run by a manager has been found to be cumbersome, and in tracing and identifying the playing apparatuses during inspection rounds, playing apparatuses are regularly overlooked. Also, what is often lacking is a fixed inspection protocol for drawing up a report of the condition or status of the playing apparatus, and it is difficult to verify whether an inspection has in effect been carried out.

[0011] An important problem that arises as a consequence of this is that it is difficult to demonstrate that the extent of maintenance and inspection has been adequate. In the event of accidents that cause serious injuries or even permanent disability, the manager is held liable if he has taken insufficient measures to guarantee the safety of the playing apparatuses, for instance in that insufficient maintenance has been performed. It is known that there is increasing litigation on liability in this kind of accidents, and that the amounts of damages to be paid (certainly in the case of permanent disability) increase in magnitude. For a manager it is therefore very important to be able to demonstrate that he has taken adequate measures to guarantee the safety through inspection in conformity with the regulations and timely maintenance, and that therefore the blame for the accident cannot be directly laid upon him. To that end, he must have administrative records at his disposal to show that timely and adequate maintenance has been carried out. In this connection, he will have to be able to demonstrate that the playing apparatus has been inspected regularly and that the apparatuses have been actually assessed for safety and that if irregularities have been observed, adequate actions have been taken, such as maintenance and/or carrying out repairs.

[0012] Despite increased attention for the management aspects of these playing apparatuses, there have not hitherto been any successful attempts to set up an inspection system which enables the status of the apparatuses to be monitored in the course of the time that

the playing apparatuses are in use, so that it can be demonstrated that the playing apparatus has always met the required safety standards. The object of the invention is to provide a method whereby the above-mentioned disadvantages are avoided and with which an adequate inspection system can be provided for installations or objects located at spread locations.

[0013] To that end, the invention provides a method in which the installations or objects to be inspected are each provided with at least one transponder, while an interrogation device is carried along by a person who is to inspect the installation or the object, which interrogation device is capable of activating a transponder when the interrogation device is located a short distance from the transponder, and recognizes data transmitted by a transponder, which data comprise at least a unique code-identifying the installation or the object. What can be achieved by providing the playing apparatus with a transponder is that an inspector must in effect report at an apparatus to obtain an electronic signature and/or to be able to carry out an inspection protocol. Such a method makes it possible to form a basis for a uniform administration, from which the status of the various installations under management appears, and which can be relied upon at a time when a care and inspection treatment is to be demonstrated.

[0014] It is noted that in this context, a transponder is understood to mean an electronic unit which comprises a transmitting circuit and a receiving circuit for an electromagnetic interrogation field, mostly combined as a transmitting/receiving circuit, and means for causing the transponder, upon activation by a suitable interrogation circuit, to transmit a unique code signal which uniquely identifies the transponder. The code can, for instance, contain a particular frequency or combination of frequencies and/or, for instance, be formed by a binary code signal with which a carrier wave is modulated. For fixing the code in a transponder, a special code circuit may be present. Further, the transponders are preferably passive transponders, i.e. that the transponders do not have a supply battery of their own. In this case, the transponders should also have a supply circuit to generate a suitable supply voltage from an interrogation field, if the transponders at least comprise active components, such as binary circuits, transistors and the like.

[0015] Transponders of the above-described kind, both passive transponders and transponders provided with a battery, are known in various embodiments and obtainable from different producers. A passive transponder capable of generating a coded reply signal in a suitable magnetic interrogation field is described, for instance, in U.S. Patent 4,333,072 and in U.S. Patent 4,196,418.

[0016] It is further noted that in this context, interrogation device is understood to mean a scanner or transceiver unit capable of cooperating with a transponder and capable of activating it to transmit in response to an

interrogation field a code signal that can be recognized by the interrogation device. It is further noted that in this context, 'a short distance' is to be understood to mean a distance of, for instance, 25 m, preferably less than 15 m, more preferably less than 10 m. In particular, 'short distance' is understood to mean at most 5 m, preferably less than 2.5 m, more preferably less than 1 m or less than 0.5 m, down to a distance zero (contact). Bridging the relatively large distances from this series generally requires active transponders, i.e., transponders provided with a supply battery of their own.

[0017] The method used according to the invention utilizes a transponder which can be activated only over a short distance, so that it can be made sure that an inspector, controller or maintenance mechanic has been present at the apparatus.

[0018] The invention further relates to an installation to be checked which is provided with at least one transponder.

[0019] In the following, the invention will be further explained on the basis of the description of an exemplary embodiment, in which a number of aspects and applications of the use of a transponder in an installation to be inspected, in this example a playing apparatus, is illustrated and elucidated.

[0020] Presently discussed is the case where a manager, such as, for instance, a municipal authority, has a number of playing apparatuses to be managed in a number of parks. These are playing apparatuses whose management is kept a record of in a central administration. To check the apparatuses for defects regularly, for instance twice every six months, the manager makes use of people who inspect the apparatuses in situ. A planning for the inspection has been drawn up, whereby a number of specific apparatuses are to be visited on a particular day. Further, the manager runs an administration in which all data relevant to the apparatuses are centrally recorded in a computer. Such data may include the date of first use, the age of an apparatus, a classification and a description of the apparatus, a history of maintenance performed, and previously established defects for said aspects, names of inspectors responsible and maintenance personnel, a sequence of aspects to be inspected, the location of the apparatus, the number of transponders that has been provided in or on a specific apparatus, and the position where the transponders are located in or on the apparatus, and the date of maintenance to be carried out. From this collection of data, together with any other planning and routing systems, the work schedule for the inspector is drawn up.

[0021] According to a first aspect of the invention, the inspector is equipped with an interrogation device which can activate a transponder provided in a playing apparatus when a scanner is located at a near distance from the transponder, and which can register data transmitted by the transponder, comprising at least a unique code identifying the playing apparatus or part thereof.

The registered data can be stored in a memory. This memory can be a simple memory unit, which forms part of the interrogation device and which stores the data of the transponder digitally. The memory unit can then, for instance, be read out by a reading unit connected to a computer. This readout can be done, for instance upon return of the inspector from the inspection round, by coupling the memory to the central computer, but the inspector can also carry along a PC which can directly read out and store the data recorded by or by means of the interrogation device, or of which the memory unit forms a part. In that case, the PC may also be provided with a communication unit which can establish a connection with a central computer, so that the data stored and processed in the PC can be fed directly from the field to the central data administration.

[0022] According to a second aspect of the invention, when storing the transponder data in a memory, a time coding can be added, thereby fixing the time when the registration occurred. The advantage thus achieved is that it is recorded not only that a particular inspection has taken place, but also when it took place.

[0023] Another aspect concerns the inspection protocol to be followed. An inspector may, upon registration of a transponder signal, be instructed by the computer to follow an inspection protocol specific to that apparatus, for instance a list with aspects of the apparatus that are to be assessed, such as the status of the hinge joints, the status of (wear-sensitive) protective parts, the status of frame parts and further aspects that influence the safety of the apparatus.

[0024] In particular, what can be accomplished by means of suitable software is that an inspector can start the inspection protocol, or can enter the data relating to the inspection, only when, or as long as, the sensor detects the code of the installation in question, in this case the playing apparatus. It is therefore possible that the identifying code of the playing apparatus itself is not fixed in the method.

[0025] According to still another aspect of the invention, in the memory, on the basis of the identifying code, a report can be inputted further to the inspection carried out on the installation by the inspector.

[0026] According to a further aspect of the invention, the installations to be checked may be provided with more than one transponder. The use of a plurality of transponders has a number of particular advantages, especially when an installation is to be inspected at several parts or at several positions. Thus, for instance, a cable railway has a cable mounted at two ends by means of a suspension construction. The provision of separate transponders in the two suspension constructions provides a certainty that both points of the apparatus have been inspected. In another case, for instance, a watchtower or a slide may be provided with a transponder, obliging an inspector to also inspect less accessible parts of an apparatus, for instance the parts that can be accessed only after stairs have been climbed.

[0027] In a still further aspect of the invention, the transponders may be adapted to provide different types of information data when the transponder is activated in a particular manner. An illustrative example is the provision of an (optionally further) transponder in a playing apparatus to enable it to be localized with a scanner at a somewhat greater distance of, for instance, a few hundreds of meters. In a variant, a transponder may be provided with sensor elements, with which it can be determined, for instance, whether an apparatus is internally rusty, or which have a detection loop, so that the lack of parts can be registered, or which are suitable to enable detection of deformations. The transponder may thus produce variable information data about an apparatus to be inspected, thereby affording a still better possibility of determining whether an apparatus is safe, in particular as regards aspects that are not perceptible from the outside of the apparatus looking safe on the face of it.

[0028] Presently, the invention will be further elucidated with reference to the single appended drawing, which illustrates in a flow diagram an example of a method according to the invention.

[0029] Indicated in the figure in block 1, as a first step of a method according to the invention, is "Consult location list". The list may be stored in a portable computer, but may also be a list on paper or a list fixed in the inspector's memory. According to the second step, indicated in block 2, the inspector (or maintenance mechanic or the like) proceeds to the object to be inspected and then switches on the interrogation device, so that in step 3 a transponder which is located in the field generated by the interrogation device, transmits a reply signal. The reply signal contains a unique code identifying the transponder in question, which code can be detected and recognized by the interrogation device in step 4. Following recognition in step 5, in step 6 the inspection program, i.e., the inspection software in the computer being carried along, is released, and the inspector can traverse the inspection program (step 7) and enter the results of the inspection.

[0030] In step 8, the program part in question is closed when the inspection of the object, insofar as it relates to this transponder, has been completed. In step 9 it is determined whether any more locations are to be checked. If so, the method starts again for a next transponder location.

[0031] It will be clear that the presence of transponders in the apparatuses, without whose activation it is impossible, at any rate not fully possible, to draw up a report, will generally be a strong incentive for an inspector to carry out the pertinent inspections completely. If the report is not complete, a central administration or central computer can immediately signal that an inspection has not, or incompletely so, been carried out, and measures can be taken to carry out an inspection in the second instance. The invention therefore has as an additional advantage that the inspections carried out

gain in quality. Further, by generating an object-dependent inspection protocol, performing the inspection can be considerably simplified for the inspector.

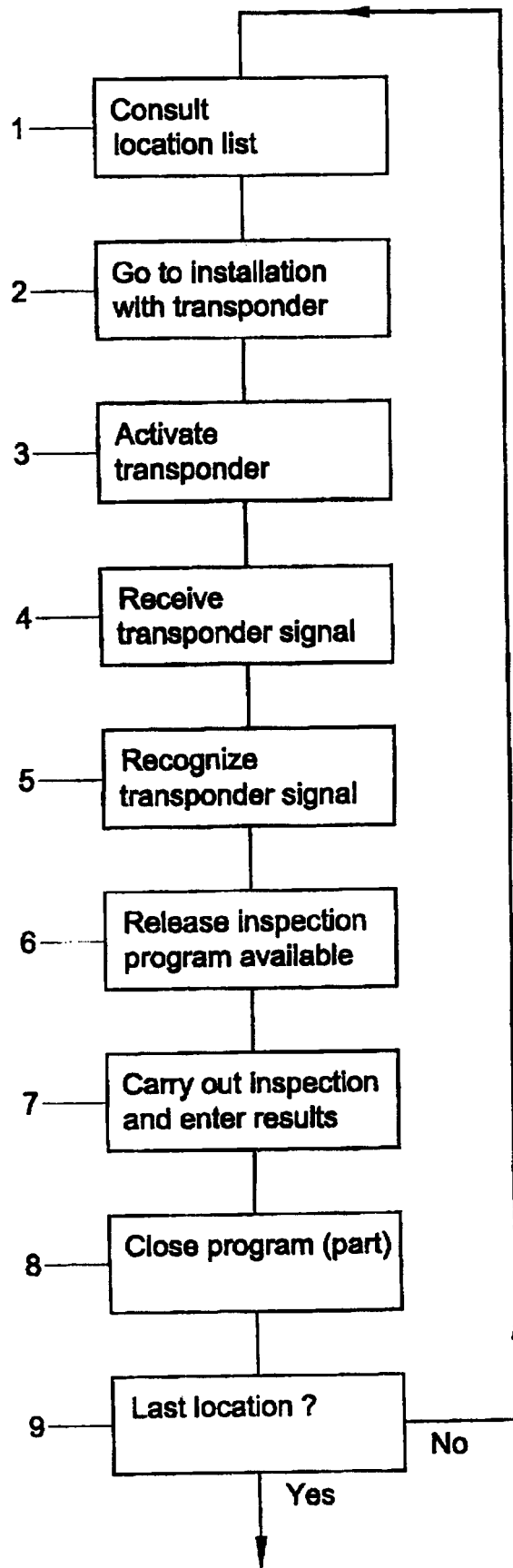
[0032] It is noted that the method described can naturally be used also in the case where the inspection entails repair, or in the case of repair alone, whether prompted by a previous inspection or not. Within the framework of the invention, the terms "inspection" and "inspecting" are interchangeable with "check", "checking"; "repair" and "repairing".

Claims

1. A method for inspecting installations or objects located at spread locations, **characterized in that** the installations or objects to be inspected are each provided with at least one transponder, while an interrogation device is carried along by a person who is to inspect the installation or the object, which interrogation device is capable of activating a transponder when the interrogation device is located a short distance from the transponder, and recognizes data transmitted by a transponder, which data comprise at least a unique code identifying the installation or the object or a part thereof, and that by means of a computer an inspection protocol associated with the specific transponder is generated, while the inspection protocol can be started and/or the data relating to the inspection can be entered into the computer, only after and/or as long as the interrogation device recognizes the code of a transponder. 15
2. A method according to claim 1, **characterized in that** the data transmitted by a transponder are stored in a memory. 20
3. A method according to claim 1 or 2, **characterized in that** when storing recognized transponder data and/or the status data relating to inspection in the memory, a time coding is added, thereby fixing the time at which the registration and/or inspection took place. 25
4. A method according to any one of claims 1 to 3, **characterized in that** on the basis of the identifying code a list of inspection operations is rendered accessible to the person, which he is to carry out. 30
5. A method according to any one of claims 1 to 4, **characterized in that** the person, further to the inspection carried out by him, enters reporting data in the memory on the basis of the identifying code. 35
6. A method according to any one of claims 1 to 5, **characterized in that** the recorded status data relating to the inspection are read in by a central computer in which a record is kept of data regarding 40

the status of the respective playing apparatus.

7. A method according to claims 1 to 6, **characterized in that** the transponder is suitable to provide variable data about one or more properties of the associated installation or the associated object, such as, for instance, data regarding the location of the installation or the object or the presence of rust formation, rupture or deformation. 45
8. An apparatus for inspecting installations or objects located at spread locations, characterized by a number of transponders which are arranged to generate, in an (electro) magnetic interrogation field generated by an interrogation device, a signal comprising at least one identification code which can be detected and recognized by the interrogation device; at least one transportable interrogation device capable of processing signals generated by the transponders; and a program device coupled to the interrogation device, which after and/or during recognition of a transponder code renders an inspection protocol accessible to enable the inspection to be carried out and registered. 50
9. An installation or object provided with at least one transponder which can be activated by an interrogation device carried or otherwise transported by a person who is to inspect the installation or object, when the interrogation device is located a short distance from the transponder, while the data transmitted by the transponder comprise at least a unique code identifying the installation or the object or a part thereof. 55
10. A computer program product arranged for carrying out an inspection within the framework of a method according to any one of the preceding claims.





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EUROPEAN SEARCH REPORT

Application Number
EP 00 20 3107

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|--|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
| X | US 4 688 026 A (CARACCILO JR ANTHONY ET AL) 18 August 1987 (1987-08-18) * abstract; figures 1-3 * * column 1, line 66 - column 3, line 53 * * column 4, line 17 - column 5, line 23 * --- | 1-5,7-10 | G07C3/14 B60R21/00 H04B1/59 H04B7/145 G07C1/20 |
| X | GB 2 260 438 A (FOLEY ELECTRONICS LIMITED) 14 April 1993 (1993-04-14) * abstract; figure * * page 1, last paragraph - page 4, paragraph 3 * * page 5, line 1 - last line * * page 6, paragraph 3 - page 7, paragraph 2 * --- | 1-10 | |
| Y | GB 2 277 397 A (ROSTER CONTROL SYST LTD) 26 October 1994 (1994-10-26) * abstract; claims; figures * * page 4, line 10 - page 5, line 8 * * page 1, line 26 - page 3, line 1 * --- | 1-10 | |
| Y | WO 96 27171 A (UNITED PARCEL SERVICE INC) 6 September 1996 (1996-09-06) * abstract; figures * * page 3, line 2 - page 4, line 2 * * page 5, line 27 - page 7, line 31 * * page 8, line 22 - line 30 * --- | 1-10 | TECHNICAL FIELDS SEARCHED (Int.Cl.7) G07C G06F |
| A | FR 2 745 926 A (LE TESSIER DIDIER) 12 September 1997 (1997-09-12) * abstract * * page 2, line 6 - page 3, line 14 * * page 4, line 25 - line 27 * * page 7, line 13 - page 8, line 15 * --- | 1-10 | |
| A | US 5 610 596 A (PETITCLERC JEAN-LOUIS) 11 March 1997 (1997-03-11) ----- | | |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 8 December 2000 | Examiner Buron, E |
| CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document | | | |

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 20 3107

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-12-2000

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| US 4688026 A | 18-08-1987 | NONE | |
| GB 2260438 A | 14-04-1993 | NONE | |
| GB 2277397 A | 26-10-1994 | CA 2138378 A | 10-11-1994 |
| | | WO 9425937 A | 10-11-1994 |
| | | US 5491672 A | 13-02-1996 |
| WO 9627171 A | 06-09-1996 | NONE | |
| FR 2745926 A | 12-09-1997 | NONE | |
| US 5610596 A | 11-03-1997 | FR 2711821 A | 05-05-1995 |
| | | CA 2133700 A | 23-04-1995 |
| | | DE 69403878 D | 24-07-1997 |
| | | DE 69403878 T | 08-01-1998 |
| | | EP 0650169 A | 26-04-1995 |
| | | JP 7182377 A | 21-07-1995 |