(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 244 231 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
11.06.2014 Bulletin 2014/24

(51) Int Cl.:
G07C 3/14 *(2006.01)*

(21) Application number: **09425154.3**

(22) Date of filing: **23.04.2009**

(54) **System for monitoring structures**

Vorrichtung zur Überwachung von Strukturen

Système de surveillance de structures

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(43) Date of publication of application:
27.10.2010 Bulletin 2010/43

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EP 2 244 231 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a method and a system for monitoring structures.

[0002] These structure can be safety structures present within a given environment, relating to a working activity for example, such as a factory or an office. It is however to be noted that the invention is also applicable to any other type of structure requiring periodic control, inspection/verification and/or maintenance operations.

[0003] It is known that at the inside of working environments, such as offices, workshops, factories, etc., periodical safety controls are required to be carried out in order to verify whether the different structures present in said environments are in compliance with the regulations in force and can have suitable features for facing danger or alarm situations. By way of example, these controls must be performed on extinguishers, fire hoses, emergency exits, etc.

[0004] Presently, those who are in charge of said controls, who can be either employees/workers of the firm operating in the monitored environment or external professional men, go to the different areas to be controlled being equipped with paper forms to fill in or with portable computers, take due note of the different inspections they have carried out and finally draw up suitable reports.

[0005] Depending on the contents of these reports, the firm that is responsible for the environment in question will be able to take the appropriate measures, carrying out renovation works or modifications to its safety structures, for example. out renovation works or modification to its safety structures, for example.

However there is no certainty as to the fact that the operators drawing up the above mentioned reports do really go to the different structures that are to be examined.

[0006] It may happen in fact that for the most different reasons, the reports on the safety structures are filled in based on fictitious data and the results exhibited do not correspond to the real situation of these structures.

[0007] This clearly involves very high risks from a practical point of view, should malfunctions, danger situations, etc. occur, since there is no certainty that the different structures in these difficult situations will have a suitable behaviour.

[0008] US 2003/0061005 discloses a handheld, portable device used to store data that indicate an operator was sufficiently close to each of a plurality of components during a safety inspection to actually inspect the components. The portable device includes a sensor that detects tokens, the pretence of which is predefined, such as radio frequency identification tags, which are affixed adjacent to the components. Messages appearing on a display of the portable device prompt the operator to proceed to each checkpoint, determine a state of the component disposed there, and if the component is not operating properly, indicate a plurality of predefined conditions from which the operator can choose to identify the observed condition of the component. The state and condition of each component entered during the safety inspection are stored as data that are subsequently transferred to a remote data storage site over a wire or wireless link.

[0009] US2005/0023347 discloses a system and method for recording inspection data for geographically remote equipment assets. A portable inspection data recording device is transported by a mobile inspector to a plurality of locations of equipment to be inspected. The data recording device includes a location detection device, and a unique equipment identifier is associated with each remote equipment location, so that travel instructions may be displayed for directing the inspector to the location of selected equipment. Recordation of inspection data for selected equipment is enabled only when the portable inspection data recording device is located proximate the selected equipment.Data recordation may be enabled by displaying an equipment-specific data recordation form on input/output display having selected data field automatically populated in response to the selected unique equipment identifier.

[0010] WO 2008/130777 discloses a device for conducting rail car inspections including an inspection module, an imaging module, a scanner module, a location module, a printer module and a communication module.

[0011] Accordingly, it is an aim of the present invention to make available a method and a system for monitoring structures enabling more efficiency and reliability in the safety controls carried out.

[0012] Another aim of the invention is to provide a method and a system by which the inspection operations on the structures to be monitored are simplified and automated.

[0013] The foregoing and further aims are substantially achieved by a method and a system for monitoring structures in accordance with the features recited in the appended claims.

[0014] Further features and advantages will become more apparent from the detailed description of a preferred but not exclusive embodiment of the invention.

[0015] This description is taken hereinafter with reference to the accompanying drawings, given by way of non-limiting example, in which:

- Fig. 1 is a block diagram of a first part of the system in accordance with the invention;
- Fig. 2 is a block diagram of a second part of the system according to the invention;
- Figs. 3 and 4 show alternative embodiments of the system of the invention.

[0016] With reference to the drawings, a system in accordance with the invention has been generally identified by reference numeral 1.

[0017] System 1 is utilised for monitoring structures 30, 40, 50. These structures 30, 40, 50 can be, by way of example only: extinguishers, fume/gas detecting plants, hydrants, fire hoses, REI-certification doors (i.e. doors having particular mechanical features, tightness

features for preventing fume passage, and heat insulation features) sprinkler plants, fire-fighting devices and first aid devices, emergency lights and buttons, emergency exits, etc.

[0018] More generally, structures 30, 40, 50 can consist of any type of structure requiring preferably periodical, control, inspection and/or maintenance operations.

[0019] In the present context reference will be made to three structures 30, 40, 50; however, the invention is also applicable to any number of structures that are to be monitored.

[0020] System 1 first of all comprises a reading device 20 adapted to read data stored in identification devices 30a, 40a, 50a.

[0021] Preferably, the identification devices 30a, 40a, 50a are electronic devices; in particular, each identification device 30a, 40a, 50a can comprise a RFID (Radio Frequency IDentification) tag. Preferably, the reading device 20 is a RFID reading device.

[0022] Alternatively, the identification devices 30a, 40a, 50a can for instance be magnetic bands, media on which bar codes are reproduced, etc.

[0023] It should be noted that the identification devices 30a, 40a, 50a can consist of any device capable of containing or representing at least one identification code that, as more clearly explained in the following, is associated with a respective structure 30, 40, 50.

[0024] Preferably, each identification device 30a, 40a, 50a is uniquely associated with the respective structure 30, 40, 50.

[0025] Therefore, the reading device 20 has a structure and operation adapted to read the codes represented by the identification devices 30a, 40a, 50a.

[0026] Generally, the reading device 20 is able to read the contents of one of the identification devices 30a, 40a, 50a, only if positioned to a distance therefrom smaller than 1 metre, and preferably smaller than 0.5 metres. In other words, the operator in charge of the controls, who uses the reading device 20 must necessarily go close to an identification device 30a, 40a, 50a for being able to carry out reading. Therefore, the reading device 20 is adapted to carry out short-range readings, i.e. readings to a closely spaced distance.

[0027] Advantageously, the reading device 20 is a portable device provided with an independent electric power, that therefore does not require connections cabled to the supply mains.

[0028] The reading device 20 further has a shape and weight making it adapted to be easily carried by a user, such as the operator entrusted with the task of monitoring structures 30, 40, 50.

[0029] Each identification device 30a, 40a, 50a is associated with a respective structure 30, 40, 50. In particular, each identification device 30a, 40a, 50a contains identification data of the respective structure 30, 40, 50. By way of example, each identification device 30a, 40a, 50a can contain an identification code uniquely associated with the structure associated with such a device.

[0030] Each identification device 30a, 40a, 50a is positioned close to the respective structure 30, 40, 50. Preferably, each identification device 30a, 40a, 50a can be directly mounted on the respective structure 30, 40, 50, preferably by gluing.

[0031] Advantageously, the identification devices 30a, 40a, 50a can be directly formed on adhesive labels, that are applied to structures 30, 40, 50 or in the vicinity of same in a quick and simple manner.

[0032] The reading device 20 is adapted to read detection data DD identifying the respective structures 30, 40, 50 from the identification devices 30a, 40a, 50a.

[0033] Preferably, system 1 further comprises a portable apparatus 80, configured for co-operating with the reading device 20. The portable apparatus 80 for instance, can be an electronic apparatus of the Personal Digital Assistant (PDA) type, a Tablet PC, a portable computer, etc.

[0034] Generally, the portable apparatus 80 has a shape and weight making it adapted to be easily carried by a user, such as the operator entrusted with the task of monitoring structures 30, 40, 50.

[0035] System 1 further comprises data input means 71 to enable an operator to input monitoring data MD relating to structures 30, 40, 50 into the system itself. As better clarified in the following, the data input means 71 can be implemented in different embodiments.

[0036] Preferably, the data input means 71 is integrated into said portable apparatus 80.

[0037] System 1 further comprises storage means 12, 30b, 40b, 50b, 120 operatively associated with said data input means 71 to store the monitoring data MD.

[0038] As it will be more apparent in the following, the storage means can be physically positioned in different manners, depending on the type of system accomplished.

[0039] Taking into account the hitherto described technical features of system 1, it is apparent that the operator must go close to structure 30, 40, 50 for being able to operate with the short-range reading device 20, and then having the possibility of inputting and storing the detected data, or monitoring data MD, as a result of the carried out control.

[0040] System 1 can have different embodiments, all falling within the scope of the present invention. These embodiments are hereinafter described by way of mere illustration and not of limitation.

[0041] In the first embodiment, system 1 comprises different components; diagrammatically shown in Fig. 1 are some of them, while shown in Fig. 2 are some of the components present in Fig. 1 together with other components not shown in Fig. 1.

[0042] Preferably, the component combination shown in Fig. 1 is used in operating steps that are different from the steps relating to the component combination shown in Fig. 2, as better clarified in the following.

[0043] As can be viewed from Fig. 1, the portable apparatus 80 comprises a memory 10, that in turn includes

at least one first register 11; stored data SD identifying structures 30, 40, 50 are contained in the first register 11.

[0044] The first register 11 can be imagined like a column having different rows and stored in each row is an identification code of a respective structure.

[0045] Preferably, the portable apparatus 80 further comprises a processing unit 60, operatively associated with the memory 10 and reading device 20.

[0046] Advantageously, communication between the reading device 20 and processing unit 60 takes place through respective wireless modules, such as Bluetooth® modules. In this way the reading device 20 and processing unit 60 can co-operate when placed to a reduced distance from each other, but at the same time can be handled in an independent manner.

[0047] Alternatively, the reading device 20 can be directly integrated into the portable apparatus 80.

[0048] The processing unit 60 carries out a comparison between the stored data SD stored in memory 10 and the detection data DD received through the reading device 20.

[0049] In particular, the processing unit 60 sequentially takes into account each identification code stored in each row of the first register 11, and compares it with the detection data DD, that could be representative of a given structure 30, 40, 50.

[0050] Should a matching occur, i.e. should the detection data DD find a match in one of the rows of the first register 11, the operator is given the possibility of inputting the monitoring data MD.

[0051] In other words, if the identification device 30a, 40a, 50a that is read by the reading device 20 is recognised by the portable apparatus 80 (since the identification data of this identification device were already present in memory 10, and in particular in the first register 11), then the operator is allowed to input said monitoring data MD.

[0052] In this manner the operator, before being in a position to input the monitoring data MD, i.e. those data on which the reports describing the state of the safety structures will be then based, is forced to go close to the structures themselves, i.e. to a distance therefrom equal to or smaller than the reading distance of the reading device 20.

[0053] To enable the operator to input the monitoring data MD, the portable apparatus 80 is preferably equipped with a user interface 70 constituting said data input means 71.

[0054] The user interface 70 may comprise display means, such as a conventional monitor or display, and data input means, such as a conventional keyboard, for example.

[0055] Advantageously, the user interface 70 can consist of a touch screen, for example.

[0056] The user interface 70 is preferably operated in a first and at least one second operating condition. In the first operating condition, the user interface 70 only allows data to be displayed, descriptive data concerning structures 30, 40, 50 previously stored in memory 10, for example. In the second operating condition, the user interface 70, in addition or as an alternative to said displaying, enables the operator to input monitoring data MD.

[0057] In the second operating condition, the user interface 70 preferably shows a suitable mask to the operator, inside which the operator can fill in fields relating to execution of an inspection or control, and to the results of this inspection or control. The monitoring data MD are the data that are inputted in these fields.

[0058] Preferably, in the first operating condition the user interface allows display of the mask relating to entry of the monitoring data MD, but does not allow these data to be inputted; in the second operating condition, on the contrary, data entry is also enabled. From the graphic point of view, the mask colour is conveniently varied from the first to the second operating conditions.

[0059] Generally, the monitoring data MD are data relating to controls and inspections carried out by the operator on structure 30, 40, 50 associated with the identification device 30a, 40a, 50a that has been recognised.

[0060] Preferably, the monitoring data MD comprise one or more of the following parameters:

- type of inspection/verification: for instance, it can consist of a visual inspection, a visual in-depth inspection; an overhauling/servicing operation, a testing operation;
- type of control: each inspection/verification is made up of one or more controls; the controls are carried out based on specific structure features that are to be monitored in time.

[0061] Therefore, the user interface 70 preferably has one or more masks, in which the monitoring data MD can be inputted following a predetermined hierarchical line; a first level of this hierarchical line consists of verifications, and a second level consists of the controls carried out for each verification.

[0062] In order to draw the operator's attention to the fact that the second operating condition is active, the colour of the screen background, or at least of some fields thereof, can be for instance modified.

[0063] The user interface 70 is operatively interlocked with the processing unit 60, so that the second operating condition of the user interface 70 is activated when the processing unit 60 ascertains that there is a match between the stored data SD and the detection data DD.

[0064] In particular, following this matching, the processing unit 60 generates a suitable activation signal AS, directed to the user interface 70 for driving the latter to the second operating condition.

[0065] Advantageously, the aforesaid memory 10 is further provided with a second register 12, in which the monitoring data MD are stored.

[0066] Therefore, memory 10 can be imagined like a table having at least two columns defining the first register 11 and second register 12, respectively; in a given raw,

in the first column (i.e. in the first register 11) there will be the identification code of a given structure and in the second column (i.e. in the second register 12) there will be the monitoring data inputted with reference to such a structure.

[0067] Fig. 2 diagrammatically shows a combination of components through which the contents of memory 10 of the portable apparatus 80 can be set.

[0068] In this configuration system 1 comprises a main computer 100; the main computer 100 can consist of a conventional PC for instance, which is suitably configured for performing the functions hereinafter described.

[0069] The main computer 100 is provided with a first communication module 110, for communicating with a reading device and receiving identification data ID of structures 30, 40, 50, from the respective identification devices 30a, 40a, 50a.

[0070] The first communication module 110 may comprise a wireless module (a Bluetooth® module, for example) or any other communication interface to enable the aforesaid data to be received from said reading device.

[0071] Advantageously, the reading device with which the first communication module 110 can communicate is said reading device 20 associated with the portable apparatus 80.

[0072] Practically, in a learning and setting step of the system, identification codes are read in the identification devices 30a, 40a, 50a, which codes will be then associated with structures 30, 40, 50 for uniquely identifying the latter.

[0073] During this step, the identification devices 30a, 40a, 50a preferably are not yet positioned at the respective structures, but they can be gathered in the vicinity of the main computer 100, so as to facilitate the starting operation concerning data input.

[0074] The main computer 100 further comprises a main storage register 120 for storing the identification data ID received through the first communication module 110.

[0075] The main computer 100 further comprises a second communication module 130 for communication with the first storage register 11 of memory 10 of the portable apparatus 80. Through the second communication module 130 at least part of the identification data ID stored in the main storage register 120 are transferred into memory 10 of the portable apparatus 80.

[0076] The identification data ID transferred to memory 10 therefore constitute the above mentioned stored data SD, that will then be used for recognising the identification devices 30a, 40a, 50a and the structures 30, 40, 50 associated therewith.

[0077] Advantageously, the main computer 100 can further comprise another communication module (not shown), for connection with a remote server, into which all data concerning planning and execution of control activities connected with safety are stored.

[0078] In the preferred embodiment, the main computer 100 is further provided with a planning module (not shown) enabling a user to schedule the different control and monitoring activities that are to be performed, through a suitable graphic interface for example.

[0079] It should be noted that also only part of the identification data ID contained in the main storage register 120 can be transferred to the first register 11 of memory 10 of the portable apparatus 80; in particular, it is advantageously possible to transfer the identification codes ID singling out only and all the structures that an operator has stated will the subject matter of the control activity. The decision on which structures are to be controlled can be taken with the backing of said planning module the function of which will be to supply the operator in charge with all information on scheduling of the inspections, the due dates, and the optimal or preferred path in the spaces in which the structures being the object of said inspection are located.

[0080] Alternatively, the aforesaid setting step is directly performed by the portable apparatus 80, through the reading device 20, without the aid of the main computer 100; reading of the identification codes ID and the related storage in the first storage register 11 can exactly be performed directly by the portable apparatus 80, before the operator in charge starts the control and inspection procedures.

[0081] In this context, the identification devices 30a, 40a, 50a can be already positioned with the respective structures 30, 40, 50 also before the initial system setting step is carried out.

[0082] In the light of the above described structure, as regards the system operation the following is to be pointed out.

[0083] First of all, an initial setting step is performed in which, by means of the reading device 20, the contents of the identification devices 30a, 40a, 50 are read. These contents are identification data ID of structures 30, 40, 50 that are to be monitored.

[0084] The identification data ID, preferably by means of the main computer 100, are transferred to the first register 11 of memory 10 of the portable apparatus 80.

[0085] Preferably, each identification device 30a, 40a, 50a, after reading, is positioned in the vicinity of the respective structure 30, 40, 50. At this point, the control activity can start being performed by the operator entrusted with this task; the operator is provided with the reading device 20 and the portable apparatus 80. The operator moves at the inside of the environment where structures 30, 40, 50 are, going close to each of them in succession. For instance, when he/she is close to structure 30 (an extinguisher, for example), he/she moves the reading device 20 close to the identification device 30a that is positioned in the vicinity of structure 30, so that the reading device 20 can supply the portable apparatus 80 with the detected datum DD read by said identification device 30a.

[0086] The processing unit 60 compares the detected datum DD with the different stored data SD and, if everything has occurred in a correct manner, verifies whether

the detected datum DD is the same as one of the stored data SD. Then the processing unit 60 generates the activation signal AS, so as to drive the user interface 80 to the second operating condition.

[0087] After performing the required control/inspection procedures, the operator can therefore input the monitoring data MD, representative of said procedures and of the pertinent results.

[0088] When the control activity has been completed, the portable apparatus 80 can be connected again to the main computer 100, so that the collected data can be downloaded into the main storage register 120 and possibly transmitted to the aforesaid remote server.

[0089] In this way it is also possible to update the planning program concerning inspections, eliminating the due dates already dealt with, and setting new due dates.

[0090] As mentioned above, within the scope of the present invention also other alternative embodiments are provided.

[0091] In a first alternative embodiment (Fig. 3), the reading device 20 is suitably associated with a portable apparatus 80; preferably, the reading device 20 is integrated into this portable apparatus 80.

[0092] The portable apparatus 80 enables the operator, through data input means 71, to input the monitoring data MD relating to structures 30, 40, 50, which structures are identified through reading of the respective identification devices 30a, 40a, 50a.

[0093] This data input means 71 can even comprise only two buttons or equivalent means, for example; one button for inputting a datum of the type "in compliance" (i.e., following the control carried out, the operator has judged that the structure in question has no problems, i.e. is in compliance with the regulations in force), and one button for inputting a datum of the type "not in compliance" (i.e. following the control carried out, the operator has judged that the structure in question does not comply with one or more of the safety criteria).

[0094] The monitoring data MD thus inputted can be stored in suitable storage means 10 integrated into the portable apparatus 80.

[0095] In particular, apparatus 80 can be provided with a memory 10, in which the identification codes detected by the reading device 20 are stored, said codes being suitably combined with the respective monitoring data MD inputted by the operator.

[0096] When inspection has been completed, the portable apparatus 80 can be connected to a main computer 100, into which the data stored in the memory of apparatus 80 are downloaded. Advantageously, the data stored in the memory of apparatus 80 are transferred to memory 120 of the main computer 100 so that the latter can keep a trace of the origin or source of these data; for instance, the monitoring data MD and the respective identification codes of the structures can be associated with an identifier of the operator who has performed said inspections.

[0097] The main computer 100 will be preferably able to carry out controls on the received data, checking, for instance, whether the examined structures actually pertained to that operator, whether the latter did not omit any of the structures that he/she should have taken into consideration, etc.

[0098] In particular, the main computer 100 can be provided with one or more storage registers in which the identification codes of the structures that are to be the object of an inspection and/or control are listed, said codes being suitably divided (through association with identifiers representative of the different operators, for example), depending on the operator who is designed to be responsible for said structures.

[0099] Alternatively, the portable apparatus 80 can comprise a wireless transmission module 81 enabling a transmission substantially in real time of the detected data by means of the reading device 20, and of an identifier representative of the operator.

[0100] The main computer 100 will then be provided with a wireless reception module 101, operation of which will be exactly the same as described above; controls will be carried out on data received by means of this wireless reception module 101.

[0101] Wireless transmission of the monitoring data MD and the identification codes of the respective structures can be provided in place of, or also in combination with storage of this information in the memory 10 of the portable apparatus 80.

[0102] As a function of the monitoring data MD received, the main computer 100 will be also able to update its database concerning due dates and scheduling of inspections.

[0103] In a further embodiment of the invention (Fig. 4), the monitoring data MD, inputted through the data input means 71, can be stored in memories 30b, 40b, 50b integrated into the identification devices 30a, 40a, 50a.

[0104] The portable apparatus 80 can then be provided with a writing device 21, such as a device adapted to write data on the memory being part of a RFID tag, for example.

[0105] The monitoring data MD in this case can comprise the inspection date and/or the result of said inspection, for example. In this way, the step of transferring the monitoring data MD to the main computer (through wireless transmission or by storage into the memory of the portable apparatus 80 and subsequent download to the main computer) can also be avoided.

[0106] On occurrence of the subsequent control, through the reading device 20, the operator will be able to detect not only the identification codes associated with structures 30, 40, 50, but also the respective monitoring data inputted during the preceding control.

[0107] The invention achieves important advantages.

[0108] First of all, the system according to the invention enables more efficiency and reliability to be obtained in the safety controls carried out.

[0109] In addition, the system of the invention allows

the inspection/verification operations of the structures present in a given environment to be simplified and automated.

Claims

1. Method for monitoring structures (30, 40, 50) comprising:

- providing a short-range reading device (20) adapted to read from identification devices (30a, 40a, 50a) associated with structures (30, 40, 50), detection data (DD) identifying at least one of said structures (30, 40, 50) ;
- providing a portable apparatus (80) configured for cooperating with the reading device (20) comprising:

  • a memory (10), that in turn includes at least one first register (11) containing stored data (SD) identifying structures (30, 40, 50);
  • a processing unit (60) operatively associated with said memory (10) and said reading device (20) ;.
  • a user interface (70) constituting data input means (71) (pag. 9, lines 9-11) to enable an operator to input monitoring data (MD) relating to said structures (30, 40, 50);

- providing a main computer (100), configured for:

  • communicating, by means of a first communication module (110),with a reading device and receiving identification data (ID) for said structures (30, 40, 50) from said identification devices (30a, 40a, 50a);
  wherein the reading device with which the first communication module (110) can communicate is said reading device (20) associated with said portable apparatus (80);
  • storing said identification data (ID) of staid structures (30, 40,50) received from said first communication module (110) in a main storage Register (120);
  • communicating, by means of a second communication module (130), with the first register (11) of said memory (10) in order to carry out transfer thereinto of at least part of the identification data (ID) stored in said main storage register (126),
  wherein the identification data (ID) transferrer to the memory (10) constitute the stored data (SD), said data being capable of being used for recognizing the identification devices (30a, 40a, 50a) and the structures (30, 40, 50) associated therewith;

wherein the method comprised the steps of:

• learning and setting, further comprising the steps of:

  o gathering identification devices (30a, 40a, 50a) in the vicinity of the main computer (100) so as to facilitate the starting operation concerning data input;
  o reading identification codes in the identification devices (30a, 40a, 50a) by means of said reading device (20), said contents being identification data (ID) of said structures (30, 40, 50) that are to be monitored, said identification devices (30a, 40a, 50a) being not yet positioned at the respective structures (30, 40, 50);
  o transfer said identification data (ID), by means of a main computer (100), specifically by said second communication module (130), to a first register (11) of memory (10) of a portable apparatus (80); said first register (11) containing stored data (SD) identifying structures (30, 40, 50);
  o positioning each identification device (30a, 40a, 50a), after reading, in the vicinity of the respective structure (30, 40, 50);

• controlling activity, further comprising the steps of:

  o moving the short range reading device (20) close to the identification device (30a) that is positioned in the vicinity of the structure (30), so that the shirt range reading device (20) can supply the portable apparatus (80) with a detected datum (DD) read by said identification device (30a);
  o comparing, by means of said processing unit (60), said detected datum (DD) with the stored data (SD) and versifying whether the detected datum (DD) is the same as one of the stored data (SD);
  o generating, by means of said processing unit (60), an activation signal (AS), so as to drive said user interface (70) from a first operating condition only allowing data to be displayed, to a second operating condition enabling the operator to input said monitoring data (MD).

2. Method for monitoring structures (30, 40, 50) accord-

ing to claim 1 further comprising the steps of:

o storing, in a main storage register (120), said identification data (ID) of said structures (30, 40,50) received from said first communication module (110);
o communicating, by means of a second communication module (130), with the first register (11) of said memory (10) in order to carry out transfer thereinto of at least part of the identification data (ID) stored in said main storage register (120),

the identification data (ID) transferred from the main storage register (120) to the first register (11) of said memory (10) defining the stored data (SD) stored in the first register (11) of the memory (10).

3. Method for monitoring structures (30, 40, 50) according to claim 2 further comprising the steps of:

• inputting data, further comprising the steps of:

o inputting monitoring data (MD), by means of data input means (71), relating to said at least one structure (30, 40, 50);
o storing in storage means (10; 30b, 40b, 50b), operatively associated with said data input means (71), said monitoring data (MD).

4. A system for monitoring structures for actuating the method of clams 1 to 3, oomprising:

- a short-range reading device (20) adapted to read from identification devices (30a, 40a, 60a) associated with structures (30, 40, 50), detection data (DD) identifying at least one of said structures (30, 40, 50);
- data input means (71) to enable an operator to input monitoring data (MD) relating to said at least one structure (30, 40, 50) into said system;
- storage means (12; 30b, 40b, 50b, 120) operatively associated with said data input means (71) for storing said monitoring data (MD);
- a portable apparatus (80) comprising a memory (10), that in turn includes at least one first register (11) containing stored data (SD) identifying structures (30, 40, 50);
- a main computer (100), provided with:

• a first communication module (110) for communicating with a reading device and receiving identification data (ID) for said structures (30, 40, 50) from said identification devices (30a, 40a, 50a);
• a main storage register (120), in which said identification data (ID) of said structures (30, 40, 50) received from said first communication module (110) are stored;
• a second communication module (130) for communicating with the first register (11) of said memory (10) in order to carry out transfer thereinto of at least part of the identification data (ID) stored in said main storage register (120),

the identification data (ID) transferred from the main storage Register (120) to the first register (11) of said memory (10) defining the stored data (SD) stored in the first register (11) of the memory (10);
wherein said portable apparatus (80) is associated with said reading device (20) and provided with:

a processing unit (60) operatively associated with said memory (10) and said reading device (20) for comparing said stored data (SD) with said detention data (DD);
a user interface (70) defining said data input means (71) and operatively interlocked with said processing unit (60) to enable an operator to input said monitoring data (MD) relating to said at least one structure (30, 40, 50) in case of matching between said stored data (SD) and detection data (DD).

5. A system as claimed in claim 4, wherein said reading device (20) is an RFID tag reader.

6. A system as claimed in anyone of claims 4 to 5, wherein each identification device (30a, 40a, 50a) comprises an RFID tag, each of them being associated with a respective structure (30, 40, 50).

7. A system as claimed in anyone of claims 4 to 6, wherein said monitoring data (MD) are representative of a monitoring or inspection operation carried out by said operator on said at least one structure (30, 40, 50).

8. A system as claimed in claim 7, wherein said user interface (70) can be driven between a first operating condition, at which input of said monitoring data (MD) is not allowed, and a second operating condition, at which input of said monitoring data (MD) is allowed.

9. A system as claimed in claim 8, wherein said processing unit (60) is configured in such a manner that in case of matching between said stored data (SD) and detection data (DD), an activation signal (AS) is generated for driving said user interface (70) to the second operating condition.

10. A system as claimed in claim 4, wherein said storage means comprises a second register (12) being part of said memory (10), for storing said monitoring data

(MD) of said at least one structure (30, 40, 50), said data being associated with the stored data (SD) identifying said at least one structure (30, 40, 50).

11. A system as claimed in claim 4, wherein said storage means comprises memories integrated into said identification devices (30a, 40a, 50a).

12. A system as claimed in claim 4, wherein said storage means comprises at least one memory integrated into a portable apparatus (80) operatively associated with said reading device (20).

13. A system as claimed in claim 4 or 14, further comprising a portable apparatus (80) provided at least with one transmission module (81) for sending said monitoring data (MD) to a main computer (100).

14. A system as claimed in claim 13, wherein said transmission module (81) is configured for sending said monitoring data (MD) and said detection data (DD) identifying the structure/s to which said monitoring data (MD) are referred, to said main computer (100).

Patentansprüche

1. Verfahren zur Überwachung von Strukturen (30, 40, 50), umfassend:

- Bereitstellen einer Nahbereichslesevorrichtung (20), die dazu geeignet ist, Erfassungsdaten (DD), die mindestens eine der Strukturen (30, 40, 50) identifizieren, von Identifizierungsvorrichtungen (30a, 40a, 50a) zu lesen, die mit Strukturen (30, 40, 50) assoziiert sind;
- Bereitstellen eines tragbaren Geräts (80), das dazu konfiguriert ist, mit der Lesevorrichtung (20) zusammenzuwirken, umfassend:

  • einen Speicher (10), der wiederum mindestens ein erstes Register (11) beinhaltet, das gespeicherte Daten (SD) enthält, die Strukturen (30, 40, 50) identifizieren;
  • eine Verarbeitungseinheit (60), die wirksam mit dem Speicher (10) und der Lesevorrichtung (20) assoziiert ist;
  • eine Benutzerschnittstelle (70), die Dateneingabemittel (71) bildet um das Eingeben von Überwachungsdaten (MD), die sich auf die Strukturen (30, 40, 50) beziehen, durch einen Bediener zu ermöglichen;

- Bereitstellen eines Hauptcomputers (100), der zu Folgendem konfiguriert ist:

  • Kommunizieren, mittels eines ersten Kommunikationsmoduls (110), mit einer Lesevorrichtung und Empfangen von Identifizierungsdaten (ID) für die Strukturen (30, 40, 50) von den Identifizierungsvorrichtungen (30a, 40a, 50a);
  wobei die Lesevorrichtung, mit der das erste Kommunikationsmodul (110) kommunizieren kann, die Lesevorrichtung (20) ist, die mit dem tragbaren Gerät (80) assoziiert ist;
  • Speichern der Identifizierungsdaten (ID) der Strukturen (30, 40, 50), die vom ersten Kommunikationsmodul (110) empfangen werden, in einem Hauptspeicherregister (120);
  • Kommunizieren, mittels eines zweiten Kommunikationsmoduls (130), mit dem ersten Register (11) des Speichers (10), um dort hinein eine Übertragung mindestens eines Teils der Identifizierungsdaten (ID), die im Hauptspeicherregister (120) gespeichert sind, durchzuführen,
  wobei die zum Speicher (10) übertragenen Identifizierungsdaten (ID) die gespeicherten Daten (SD) bilden, wobei die Daten dazu fähig sind, zum Erkennen der Identifizierungsvorrichtungen (30a, 40a, 50a) und der damit assoziierten Strukturen (30, 40, 50) verwendet zu werden;

wobei das Verfahren die folgenden Schritte umfasst:

• Lernen und Einstellen, ferner umfassend die folgenden Schritte:

  o Sammeln von Identifizierungsvorrichtungen (30a, 40a, 50a) in der Nähe des Hauptcomputers (100), sodass der Startvorgang hinsichtlich der Dateneingabe vereinfacht wird;
  o Lesen von Identifizierungscodes in den Identifizierungsvorrichtungen (30a, 40a, 50a) mittels der Lesevorrichtung (20), wobei die Inhalte Identifizierungsdaten (ID) der zu überwachenden Strukturen (30, 40, 50) sind, wobei die Identifizierungsvorrichtungen (30a, 40a, 50a) noch nicht an den entsprechenden Strukturen (30, 40, 50) positioniert sind;
  o Übertragen der Identifizierungsdaten (ID) mittels eines Hauptcomputers (100), im Besonderen durch das zweite Kommunikationsmodul (130), an ein erstes Register (11) des Speichers (10) eines tragbaren Geräts (80); wobei das erste Register (11) gespeicherte Daten (SD) enthält, die Strukturen (30, 40, 50)

identifizieren;
o Positionieren einer jeden Identifizierungsvorrichtung (30a, 40a, 50a), nach dem Lesen, in der Nähe der entsprechenden Struktur (30, 40, 50);

• Regeln der Aktivität, ferner umfassend die folgenden Schritte:

o Bewegen der Nahbereichslesevorrichtung (20) nahe zur Identifizierungsvorrichtung (30a), die in der Nähe der Struktur (30) positioniert ist, sodass die Nahbereichslesevorrichtung (20) das tragbare Gerät (80) mit einem erfassten Datum (DD), das von der Identifizierungsvorrichtung (30a) gelesen wurde, versorgen kann;
o Vergleichen, mittels der Verarbeitungseinheit (60), des erfassten Datums (DD) mit den gespeicherten Daten (SD) und Verifizieren, ob das erfasste Datum (DD) dasselbe wie eines der gespeicherten Daten (SD) ist;
o Erzeugen, mittels der Verarbeitungseinheit (60), eines Aktivierungssignals (AS), sodass die Benutzerschnittstelle (70) von einem ersten Betriebszustand, in dem nur das Darstellen von Daten gestattet wird, in einen zweiten Betriebszustand, in dem das Eingeben der Überwachungsdaten (MD) durch den Bediener ermöglicht wird, gesteuert wird.

2. Verfahren zur Überwachung von Strukturen (30, 40, 50) nach Anspruch 1, ferner umfassend die folgenden Schritte:

o Speichern, in einem Hauptspeicherregister (120), der Identifizierungsdaten (ID) der Strukturen (30, 40, 50), die vom ersten Kommunikationsmodul (110) empfangen werden;
o Kommunizieren, mittels eines zweiten Kommunikationsmoduls (130), mit dem ersten Register (11) des Speichers (10), um dort hinein eine Übertragung mindestens eines Teils der Identifizierungsdaten (ID), die im Hauptspeicherregister (120) gespeichert sind, durchzuführen,

wobei die Identifizierungsdaten (ID), die vom Hauptspeicherregister (120) zum ersten Register (11) des Speichers (10) übertragen werden, die gespeicherten Daten (SD) definieren, die im ersten Register (11) des Speichers (10) gespeichert sind.

3. Verfahren zur Überwachung von Strukturen (30, 40, 50) nach Anspruch 2, ferner umfassend die folgenden Schritte:

• Eingeben von Daten, ferner umfassend die folgenden Schritte:

o Eingeben von Überwachungsdaten (MD), mittels Dateneingabemitteln (71), die sich auf die mindestens eine Struktur (30, 40, 50) beziehen;
o Speichern der Überwachungsdaten (MD) in Speichermitteln (10; 30b, 40b, 50b), die wirksam mit den Dateneingabemitteln (71) assoziiert sind.

4. System zur Überwachung von Strukturen zum Durchführen des Verfahrens nach den Ansprüchen 1 bis 3, umfassend:

- eine Nahbereichslesevorrichtung (20), die dazu geeignet ist, Erfassungsdaten (DD), die mindestens eine der Strukturen (30, 40, 50) identifizieren, von Identifizierungsvorrichtungen (30a, 40a, 50a) zu lesen, die mit Strukturen (30, 40, 50) assoziiert sind;
- Dateneingabemittel (71), um das Eingeben von Überwachungsdaten (MD), die sich auf die mindestens eine Struktur (30, 40, 50) beziehen, durch einen Bediener in das System zu ermöglichen;
- Speichermittel (12; 30b, 40b, 50b, 120), die wirksam mit den Dateneingabemitteln (71) zum Speichern der Überwachungsdaten (MD) assoziiert sind;
- ein tragbares Gerät (80), umfassend einen Speicher (10), der wiederum mindestens ein erstes Register (11) beinhaltet, das gespeicherte Daten (SD) enthält, die Strukturen (30, 40, 50) identifizieren;
- einen Hauptcomputer (100), der mit Folgendem versehen ist:

• einem ersten Kommunikationsmodul (110) zum Kommunizieren mit einer Lesevorrichtung und zum Empfangen von Identifizierungsdaten (ID) für die Strukturen (30, 40, 50) von den Identifizierungsvorrichtungen (30a, 40a, 50a);
• einem Hauptspeicherregister (120), in dem die Identifizierungsdaten (ID) der Strukturen (30, 40, 50), die vom ersten Kommunikationsmodul (110) empfangen werden, gespeichert sind;
• einem zweiten Kommunikationsmodul (130) zum Kommunizieren mit dem ersten Register (11) des Speichers (10), um dort hinein eine Übertragung mindestens eines Teils der Identifizierungsdaten (ID), die im

Hauptspeicherregister (120) gespeichert sind, durchzuführen,

wobei die Identifizierungsdaten (ID), die vom Hauptspeicherregister (120) zum ersten Register (11) des Speichers (10) übertragen werden, die gespeicherten Daten (SD) definieren, die im ersten Register (11) des Speichers (10) gespeichert sind;
wobei das tragbare Gerät (80) mit der Lesevorrichtung (20) assoziiert ist und mit Folgendem versehen ist:

• einer Verarbeitungseinheit (60), die wirksam mit dem Speicher (10) und der Lesevorrichtung (20) assoziiert ist, um die gespeicherten Daten (SD) mit den Erfassungsdaten (DD) zu vergleichen;
• einer Benutzerschnittstelle (70), die die Dateneingabemittel (71) definiert und wirksam mit der Verarbeitungseinheit (60) verriegelt ist, um im Falle einer Übereinstimmung zwischen den gespeicherten Daten (SD) und den Erfassungsdaten (DD) das Eingeben der Überwachungsdaten (MD), die sich auf die mindestens eine Struktur (30, 40, 50) beziehen, durch einen Bediener zu ermöglichen.

5. System nach Anspruch 4, wobei die Lesevorrichtung (20) ein RFID-Markierungsleser ist.

6. System nach einem der Ansprüche 4 bis 5, wobei jede Identifizierungsvorrichtung (30a, 40a, 50a) eine RFID-Markierung umfasst, wobei jede davon mit einer entsprechenden Struktur (30, 40, 50) assoziiert ist.

7. System nach einem der Ansprüche 4 bis 6, wobei die Überwachungsdaten (MD) für einen Überwachungs- oder Kontrollvorgang repräsentativ sind, der vom Bediener auf die mindestens eine Struktur (30, 40, 50) durchgeführt wird.

8. System nach Anspruch 7, wobei die Benutzerschnittstelle (70) zwischen einem ersten Betriebszustand, in dem das Eingeben der Überwachungsdaten (MD) nicht gestattet wird, und einem zweiten Betriebszustand, in dem das Eingeben der Überwachungsdaten (MD) gestattet wird, gesteuert wird.

9. System nach Anspruch 8, wobei die Verarbeitungseinheit (60) so konfiguriert ist, dass im Falle einer Übereinstimmung zwischen den gespeicherten Daten (SD) und den Erfassungsdaten (DD) ein Aktivierungssignal (AS) erzeugt wird, um die Benutzerschnittstelle (70) zum zweiten Betriebszustand zu steuern.

10. System nach Anspruch 4, wobei die Speichermittel ein zweites Register (12), das ein Teil des Speichers (10) ist, zum Speichern der Überwachungsdaten (MD) der mindestens einen Struktur (30, 40, 50) umfassen, wobei die Daten mit den gespeicherten Daten (SD) assoziiert sind, die die mindestens eine Struktur (30, 40, 50) identifizieren.

11. System nach Anspruch 4, wobei die Speichermittel Speicher umfassen, die in die Identifizierungsvorrichtungen (30a, 40a, 50a) integriert sind.

12. System nach Anspruch 4, wobei die Speichermittel mindestens einen Speicher umfassen, der in ein tragbares Gerät (80) integriert ist, das wirksam mit der Lesevorrichtung (20) assoziiert ist.

13. System nach Anspruch 4 oder 14, ferner umfassend ein tragbares Gerät (80), das mindestens mit einem Übertragungsmodul (81) versehen ist, um die Überwachungsdaten (MD) an einen Hauptcomputer (100) zu senden.

14. System nach Anspruch 13, wobei das Übertragungsmodul (81) zum Senden der Überwachungsdaten (MD) und der Erfassungsdaten (DD), welche die Struktur/en, auf die sich die Überwachungsdaten (MD) beziehen, identifizieren, zum Hauptcomputer (100) konfiguriert ist.

Revendications

1. Procédé de surveillance de structures (30, 40, 50) comprenant :

- le montage d'un dispositif de lecture (20) à faible portée capable de lire, à partir de dispositifs d'identification (30a, 40a, 50a) associés aux structures (30, 40, 50), des données de détection (DD) identifiant au moins une desdites structures (30, 40, 50) ;
- le montage d'un appareil portable (80) configuré pour coopérer avec le dispositif de lecture (20) comprenant :

• une mémoire (10), qui à son tour comprend au moins un premier registre (11) contenant des données stockées (SD) identifiant des structures (30, 40, 50) :
• une unité de traitement (60) associée fonctionnellement à ladite mémoire (10) et au dit dispositif de lecture (20) ;
• une interface utilisateur (70) constituant les moyens d'entrée de données (71) pour permettre à un opérateur d'entrer des données de surveillance (MD) concernant lesdites structures (30, 40, 50) ;

- le montage d'un ordinateur principal (100), configuré pour :

  • communiquer, au moyen d'un premier module de communication (110), avec un dispositif de lecture et recevoir des données d'identification (ID) pour lesdites structures (30, 40, 50) à partir desdits dispositifs d'identification (30a, 40a, 50a) ;
  dans lequel le dispositif de lecture avec lequel le premier module de communication (110) peut communiquer est ledit dispositif de lecture (20) associé au dit appareil portable (80) ;
  • stocker lesdites données d'identification (ID) desdites structures (30, 40, 50), reçues dudit premier module de communication (110), dans un registre de mémoire principal (120) ;
  • communiquer, au moyen d'un second module de communication (130) avec le premier registre (11) de ladite mémoire (10) afin d'y effectuer le transfert d'au moins une partie des données d'identification (ID) stockées dans ledit registre de mémoire principal (120),
  dans lequel les données d'identification (ID) transférées à la mémoire (10) constituent les données stockées (SD), lesdites données pouvant être utilisées pour reconnaître les dispositifs d'identification (30a, 40a, 50a) et les structures (30, 40, 50) associées à ceux-ci ;

où le procédé comprend les étapes de :

  • apprentissage et de réglage, comprenant de plus les étapes de :

    o rassemblement des dispositifs d'identification (30a, 40a, 50a) à proximité de l'ordinateur principal (100) de sorte à faciliter le démarrage relatif à l'entrée des données ;
    o lecture des codes d'identification dans les dispositifs d'identification (30a, 40a, 50a) au moyen dudit dispositif de lecture (20), lesdits contenus étant des données d'identification (ID) desdites structures (30, 40, 50) devant être surveillées, lesdits dispositifs d'identification (30a, 40a, 50a) n'étant pas encore positionnés au niveau des structures respectives (30, 40, 50) ;
    o transfert desdites données d'identification (ID), au moyen d'un ordinateur principal (100), précisément par ledit second module de communication (130), à un premier registre (11) de mémoire (10) d'un appareil portable (80) ; ledit premier registre (11) contenant des données stockées (SD) identifiant des structures (30, 40, 50) ;
    o positionnement de chaque dispositif d'identification (30a, 40a, 50a), après lecture, à proximité de la structure respective (30, 40, 50) ;

  • contrôle d'activité, comprenant de plus les étapes de :

    o déplacement du dispositif de lecture (20) à faible portée près du dispositif d'identification (30a) étant placé à proximité de la structure (30), de sorte que le dispositif de lecture (20) à faible portée puisse fournir à l'appareil portable (80) une donnée détectée (DD) lue par ledit dispositif d'identification (30a) ;
    o comparaison, au moyen de ladite unité de traitement (60), de ladite donnée détectée (DD) avec les données stockées (SD) et de vérification de la similitude de la donnée détectée (DD) à l'une des données stockées (SD) ;
    o génération, au moyen de ladite unité de traitement (60), d'un signal d'activation (AS), de sorte à piloter ladite interface utilisateur (70) d'une première condition fonctionnelle, ne permettant que l'affichage des données, à une seconde condition fonctionnelle permettant à l'opérateur d'entrer lesdites données de surveillance (MD).

2. Procédé de surveillance de structures (30, 40, 50) selon la revendication 1 comprenant de plus les étapes de :

  • stockage, dans un registre de mémoire principal (120), desdites données d'identification (ID) desdites structures (30, 40, 50) reçues dudit premier module de communication (110) ;
  • communication, au moyen d'un second module de communication (130), avec le premier registre (11) de ladite mémoire (10) afin d'y effectuer le transfert d'au moins une partie des données d'identification (ID) stockées dans ledit registre de mémoire principal (120),

les données d'identification (ID) transférées du registre de mémoire principal (120) au premier registre (11) de ladite mémoire (10) définissant les données stockées (SD) stockées dans le premier registre (11) de la mémoire (10).

3. Procédé de surveillance de structures (30, 40, 50) selon la revendication 2 comprenant de plus les étapes :

• d'entrée de données, comprenant de plus les étapes :

o d'entrée de données de surveillance (MD), par le biais de moyens d'entrée de données (71), concernant ladite au moins une structure (30, 40, 50) ;
o de stockage dans des moyens de stockage (10 ; 30b, 40b, 50b), fonctionnellement associés auxdits moyens d'entrée de données (71), desdites données de surveillance (MD).

4. Système de surveillance de structures servant à mettre en action le procédé selon les revendications de 1 à 3, comprenant :

- un dispositif de lecture (20) à faible portée capable de lire à partir des dispositifs d'identification (30a, 40a, 50a) associés aux structures (30, 40, 50), des données de détection (DD) identifiant au moins une desdites structures (30, 40, 50) ;
- des moyens d'entrée de données (71) pour permettre à un opérateur d'entrer des données de surveillance (MD) concernant ladite au moins une structure (30, 40, 50) dans ledit système ;
- des moyens de stockage (12 ; 30b, 40b, 50b, 120) fonctionnellement associés auxdits moyens d'entrée de données (71) servant à stocker lesdites données de surveillance (MD) ;
- un appareil portable (80) comprenant une mémoire (10), qui à son tour comprend au moins un premier registre (11) contenant des données stockées (SD) identifiant des structures (30, 40, 50);
- un ordinateur principal (100), pourvu :

• d'un premier module de communication (110) servant à communiquer avec un dispositif de lecture et à recevoir des données d'identification (ID) pour lesdites structures (30, 40, 50) à partir desdits dispositifs d'identification (30a, 40a, 50a) ;
• d'un registre de mémoire principal (120), dans lequel lesdites données d'identification (ID) desdites structures (30, 40, 50) reçues dudit premier module de communication (110) sont stockées ;
• d'un second module de communication (130) servant à communiquer avec le premier registre (11) de ladite mémoire (10) afin d'y effectuer le transfert d'au moins une partie des données d'identification (ID) stockées dans ledit registre de mémoire principal (120),

les données d'identification (ID) transférées du registre de mémoire principal (120) au premier registre (11) de ladite mémoire (10) définissant les données stockées (SD) stockées dans le premier registre (11) de la mémoire (10) ;
dans lequel ledit appareil portable (80) est associé au dit dispositif de lecture (20) et est pourvu :

• d'une unité de traitement (60) associée fonctionnellement à ladite mémoire (10) et au dit dispositif de lecture (20) afin de comparer lesdites données stockées (SD) auxdites données de détection (DD) ;
• d'une interface utilisateur (70) définissant lesdits moyens d'entrée de données (71) et fonctionnellement accouplée à ladite unité de traitement (60) pour permettre à un opérateur d'entrer lesdites données de surveillance (MD) concernant ladite au moins une structure (30, 40, 50) en cas de correspondance entre lesdites données stockées (SD) et les données de détection (DD).

5. Système selon la revendication 4, dans lequel ledit dispositif de lecture (20) est un lecteur de balise RFID.

6. Système selon l'une quelconque des revendications de 4 à 5, dans lequel chaque dispositif d'identification (30a, 40a, 50a) comprend une balise RFID, chacun étant associé à une structure correspondante (30, 40, 50).

7. Système selon l'une quelconque des revendications de 4 à 6, dans lequel lesdites données de surveillance (MD) sont représentatives d'une opération de surveillance ou d'inspection effectuée par ledit opérateur sur ladite au moins une structure (30, 40, 50).

8. Système selon la revendication 7, dans lequel ladite interface utilisateur (70) peut être pilotée entre une première condition fonctionnelle, dans laquelle l'entrée desdites données de surveillance (MD) n'est pas autorisée, et une seconde condition fonctionnelle, dans laquelle l'entrée desdites données de surveillance (MD) est autorisée.

9. Système selon la revendication 8, dans lequel ladite unité de traitement (60) est configurée de manière à ce qu'en cas de correspondance entre lesdites données stockées (SD) et les données de détection (DD), un signal d'activation (AS) soit généré pour piloter ladite interface utilisateur (70) dans la seconde condition fonctionnelle.

10. Système selon la revendication 4, dans lequel ledit moyen de stockage comprend un second registre (12) faisant partie de ladite mémoire (10) pour stocker lesdites données de surveillance (MD) de ladite au moins une structure (30, 40, 50), lesdites données étant associées aux données stockées (SD) identifiant ladite au moins une structure (30, 40, 50).

11. Système selon la revendication 4, dans lequel ledit moyen de stockage comprend des mémoires intégrées dans lesdits dispositifs d'identification (30a, 40a, 50a).

12. Système selon la revendication 4, dans lequel ledit moyen de stockage comprend au moins une mémoire intégrée dans un appareil portable (80) fonctionnellement associé au dit dispositif de lecture (20).

13. Système selon les revendications 4 ou 14, comprenant de plus un appareil portable (80) pourvu au moins d'un module de transmission (81) servant à envoyer lesdites données de surveillance (MD) à un ordinateur principal (100).

14. Système selon la revendication 13, dans lequel ledit module de transmission (81) est configuré pour envoyer lesdites données de surveillance (MD) et lesdites données de détection (DD), identifiant la(es) structure(s) au(x)quelle(s) lesdites données de surveillance (MD) se réfèrent, au dit ordinateur principal (100).

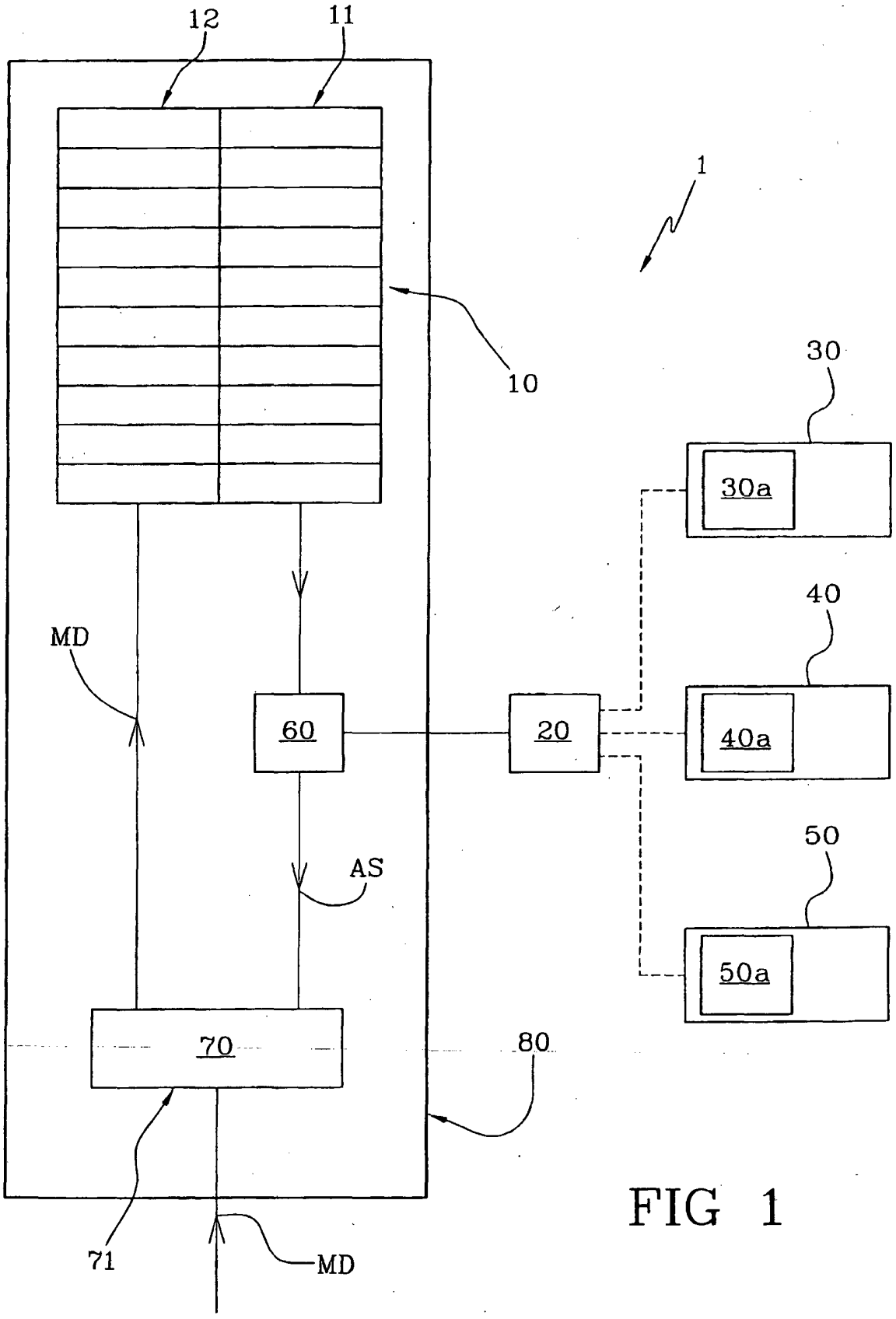


FIG 1

FIG 2

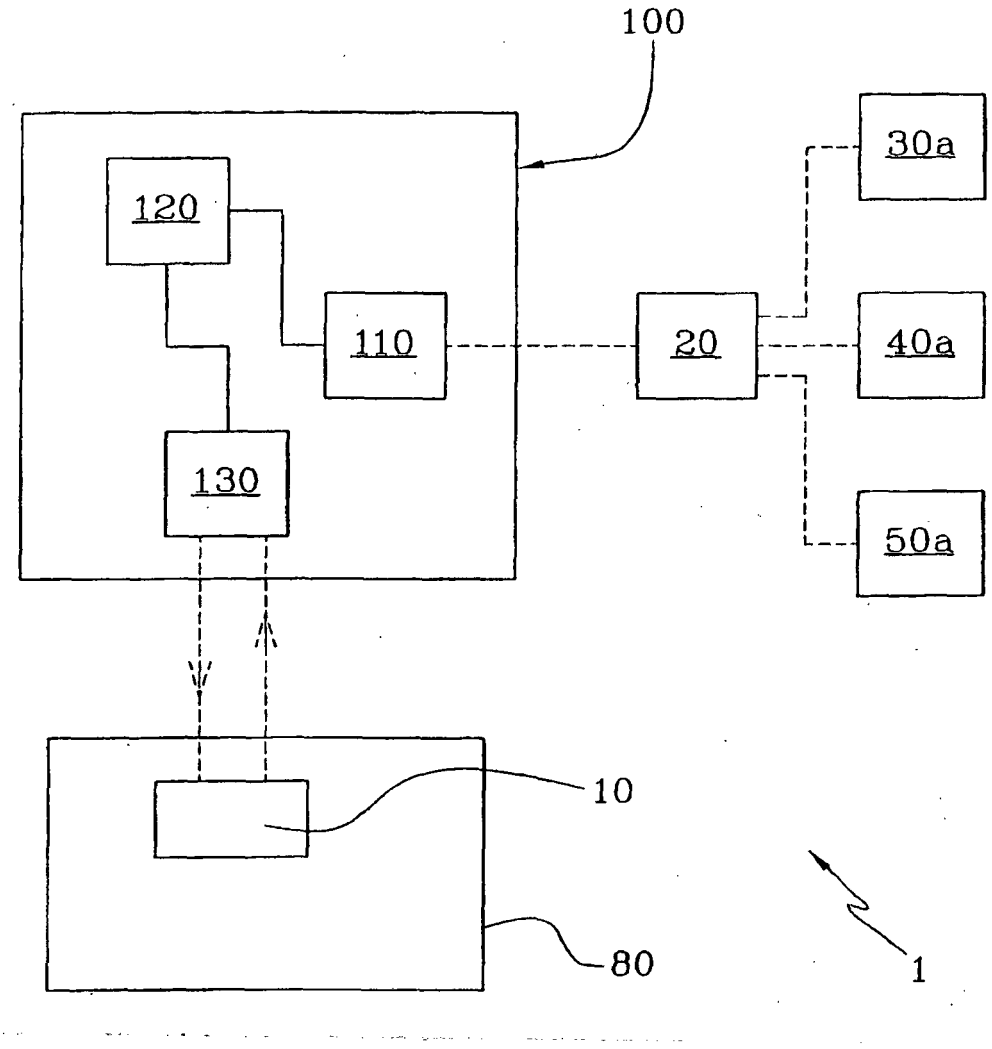


FIG 3

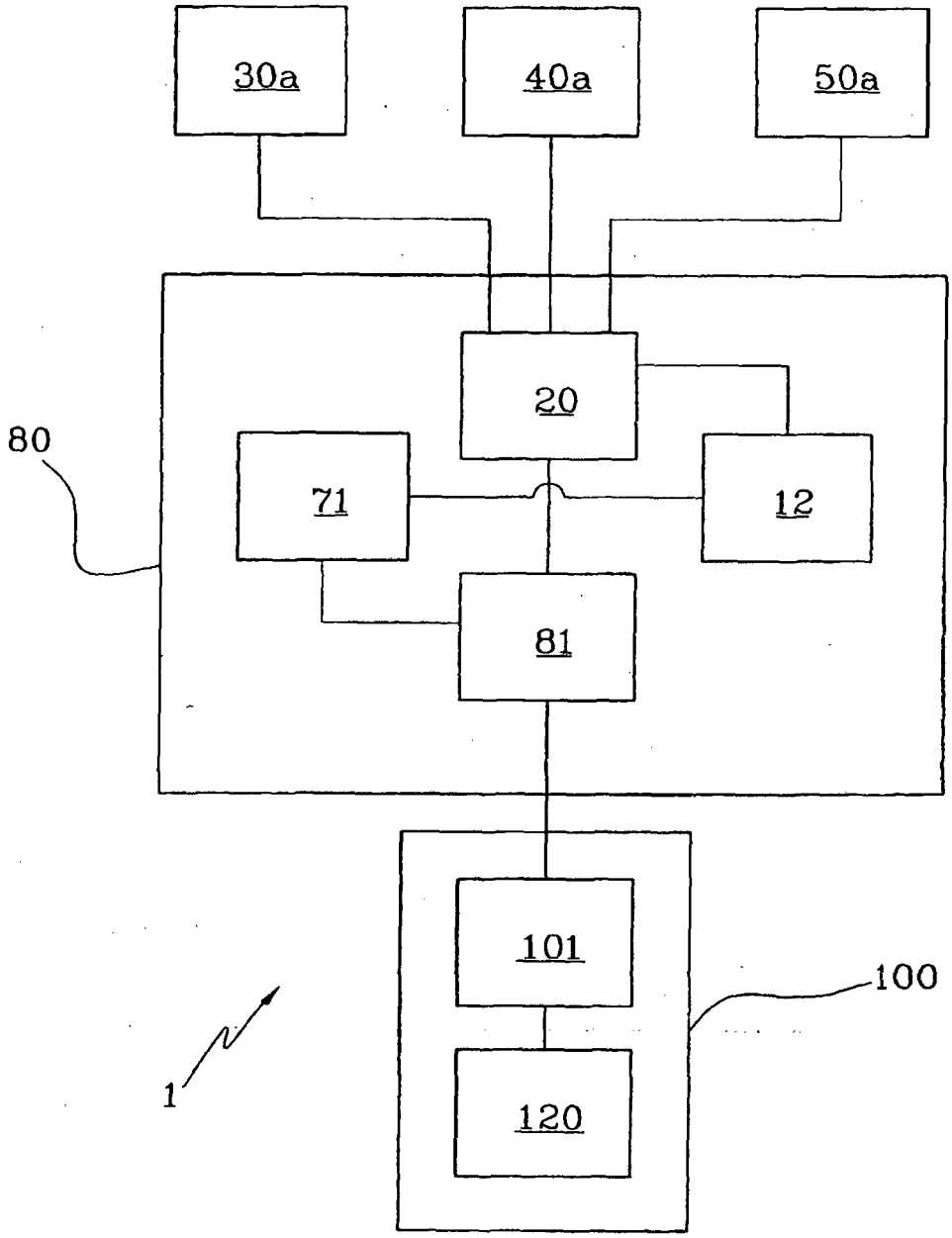
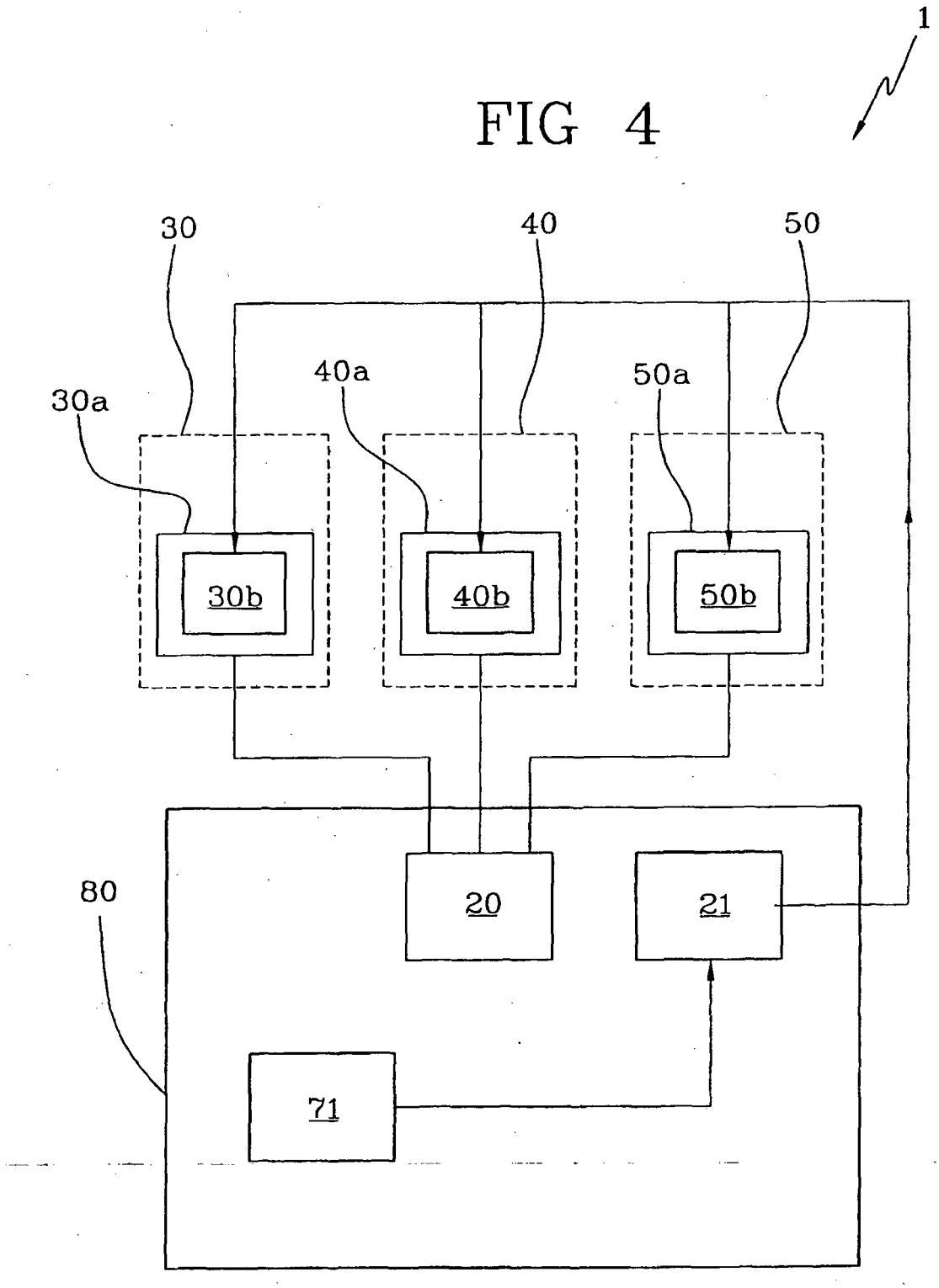


FIG 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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