



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.11.2005 Bulletin 2005/46

(51) Int Cl.7: **G08B 17/12**

(21) Application number: **05425156.6**

(22) Date of filing: **16.03.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR LV MK YU

(72) Inventor: **Scrocca, Sandro, General Contractor SRL**
00144 Roma (IT)

(74) Representative: **Iannone, Carlo Luigi et al**
Ing. Barzanò & Zanardo Roma S.p.A.
Via Piemonte, 26
00187 Roma (IT)

(30) Priority: **14.05.2004 IT RM20040245**

(71) Applicant: **General Contractor SRL**
00144 Rome (IT)

(54) **Method, apparatus and system for optimised detection of events in a geographical area**

(57) The invention relates to a method for detecting and monitoring events on a territory, comprising the use of at least a directional sensor (1) and at least a relevant device for moving said directional sensor (1) for cyclically scanning the territory, characterised in that each scanning cycle of territory comprises the motion of said at least one directional sensor (1) with a first rotation about a vertical axis (2) of an angle between 0° and 360° and a second rotation of an angle (α) between 0° and 90° about horizontal axis perpendicular to the laying direction of said at least one directional sensor (1), the method comprising a preliminary step during which di-

vides said first rotation in a first number of first angular sectors and said second rotation in a second number of second angular sectors so as to divide the territory into corona circular sectors, each scanning cycle comprising the motion of at least one directional sector (1) so as to direct it later toward one or more of said corona circular sectors, detection of an event occurring by comparison of detected instantaneous values with an assembly of reference values for one or more chemical-physical parameters in said territory.

The invention further relates to an apparatus implementing the method according to the invention connected to a central unit (200).

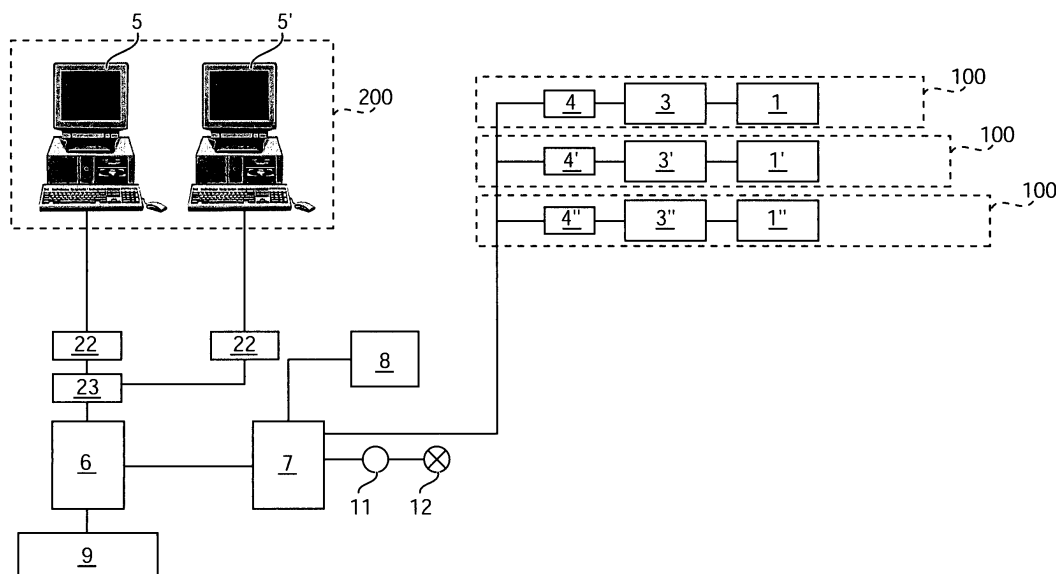


Fig.3

Description

[0001] The present invention relates to a method for optimised detection of events on a geographical area, to an apparatus employing said method and to a detection system.

[0002] More particularly, the invention concerns a method able to guarantee a scanning of a limited territory, in such a way to detect certain kind of events on the territory (e.g. fires, ice on different surfaces, hydro-thermal alteration) in an optimised way, i.e. concentrating the more frequent scanning on sub-regions, that can be modified with the passing of time. The invention further relates to an apparatus implementing the method of the invention using a (tele-) sensor and robotic means. The invention further relates to system wherein one or more apparatuses are connected to a remote processing and control unit.

[0003] As it is well known, an always more frequent need of controlling territory and monitoring environment is due to the increase of events such as fires, safety and environment degrade, road safety (ice, tunnels).

[0004] To this end, nowadays, dedicated control systems with convenient costs have not been employed.

[0005] Particularly, the Applicant does not know systems having a capillary distribution of detection units that are efficient, reliable and economically convenient.

[0006] Even more, automatised systems do not exist able to monitor the creation of code along highways and diffusing the relevant data without violating privacy, since these systems use video shots.

[0007] Object of the present invention is that of providing a method for detecting events within a pre-set volume solving the above-mentioned drawbacks.

[0008] Main object of the present invention is that of providing the apparatuses and instruments necessary for carrying out the method according to the invention.

[0009] Further object of the present invention is that of providing an apparatus for implementing the method according to the invention.

[0010] It is object of the invention a method for detecting and monitoring events on a territory, comprising the use of at least a directional sensor and at least a relevant device for moving said directional sensor for cyclically scanning the territory, characterised in that each scanning cycle of territory comprises the motion of said at least one directional sensor with a first rotation about a vertical axis of an angle between 0° and 360° and a second rotation of an angle between 0° and 90° about horizontal axis perpendicular to the laying direction of said at least one directional sensor, the method comprising a preliminary step during which divides said first rotation in a first number of first angular sectors and said second rotation in a second number of second angular sectors so as to divide the territory into corona circular sectors, each scanning cycle comprising the motion of at least one directional sector so as to direct it later toward one or more of said corona circular sectors, detection of an

event occurring by comparison of detected instantaneous values with an assembly of reference values for one or more chemical-physical parameters in said territory.

[0011] Preferably, according to the invention, said second rotation is a rotation of an angle between 0° and 80°.

[0012] Preferably, according to the invention, said first angular sectors are identical angular sectors.

[0013] Preferably, according to the invention, said first identical angular sector correspond each to an angle corresponding to the focal opening of one of said at least one directional sensor.

[0014] Preferably, according to the invention, said second angular sectors are identical angular sectors.

[0015] Preferably, according to the invention, said second identical angular sector correspond each to an angle corresponding to the focal opening of one of said at least one directional sensor.

[0016] Preferably, according to the invention, the method comprises a preliminary scanning, carried out at regular intervals, for individuating alterations of pre-set chemical-physical parameters with respect to said reference values, said one or more corona circular sectors comprising the sectors wherein said alterations have been individuated.

[0017] Preferably, according to the invention, during each scanning cycle, said one or more corona circular sector are subjected to scanning with a resolution higher than the preliminary scanning.

[0018] Advantageously, according to the invention, said at least one directional sensor is each time directed toward the centre of said corona circular sectors.

[0019] Preferably, according to the invention, corona circular sectors wherein alterations of pre-set parameters have been individuated are subjected to scanning with a higher frequency than the other sectors.

[0020] Advantageously, according to the invention, the method comprises the use of one or more not directional sectors.

[0021] Advantageously, according to the invention, inventive method comprises a preliminary step wherein said at least one directional sensor is calibrated measuring a chemical-physical parameter of a pre-set territory remote zone at the ground level or above the ground level, said chemical-physical parameter being also measured by said at least one not directional sector provided close to said remote point.

[0022] Preferably, according to the invention, at least two directional sensors are moved, for example a stand-ard telecamera and an infrared thermo-camera.

[0023] Advantageously, according to the invention, individuation of the position of a detected event occurs by the polar co-ordinates obtained by the programming of the sensor motion.

[0024] Preferably, according to the invention, positions of detected events are displayed overlapping the same on a bi-dimensional territorial map, reconstructing on said map said corona circular sectors.

[0025] It is further object of the present invention an apparatus for detecting and monitoring events on a territory, comprising a data detection fixed site, provided with at least a directional sensor, characterised in that it implements the method according to the invention.

[0026] Preferably, according to the invention, said at least a directional sensor is an optical sensor, particularly an infrared sensor.

[0027] Preferably, according to the invention, said at least one directional sensor is a variable focal sensor.

[0028] Preferably, according to the invention, said at least one directional sensor is a temperature sensor.

[0029] Advantageously, according to the invention, said fixed control site comprises a metallic support element at the top of which a container (mainly a metallic container) is housed, within which said at least one directional sensor as well as a motion robotics for said sensor are provided.

[0030] Always according to the invention, said support element can be provided with electric self-supplying photovoltaic panels.

[0031] According to the invention, the apparatus can comprise one or more not directional sensors.

[0032] It is still object of the present invention a system for detecting and monitoring events on a territory, characterised in that it comprises one or more apparatuses according to the invention, the system further comprising a central unit processing the information received from said one or more detection sites.

[0033] Preferably, according to the invention, each one of said one or more sites comprises a local processor suitable to carry out a pre-processing of the meaningful data to be transmitted to the central processing unit.

[0034] Preferably, according to the invention, transmission of said meaningful data occurs by a detection data transmission modem provided in each site.

[0035] Preferably, according to the invention, said transmission occurs by cable telephony or by mobile telephones.

[0036] Preferably, according to the invention, a receiving unit receives said meaningful data.

[0037] Preferably, according to the invention, said meaningful data are transmitted by the receiving unit to a data switching unit, sending the data to the central unit comprising at least on electronic processor and/or storing them within a storage memory.

[0038] Advantageously according to the invention, each one of said one or more control sites comprises a laser laying system for controlling the proper scanning of said at least one sensor.

[0039] According to the invention, territory positioning of the control sites can be made according to a preordained geometric matrix with linked nodes.

[0040] According to the invention, the system can comprise at least one installation comprising a surface monitored by at least one local sensor with respect to one or more chemical-physical parameters, said sur-

face being suitable to be monitored by said at least one directional sensor at pre-set time instants.

[0041] The invention will be described for illustrative and not limitative purposes with reference to the drawing of the enclosed figures, wherein:

figure 1 shows a zone subjected to scanning by the method according to the present invention;

figure 2 shows an example of overlapping of the scanning field according to figure 1 with a bidimensional territory map;

figure 3 shows the block diagram of the apparatus according to an embodiment of the invention.

[0042] Detection method, preferably tele-detection, according to the invention provides a preliminary step of setting the detection modes in function of the territory ambit, of the strategies and of the control priority.

[0043] Detection modes and detected data are respectively processed and superimposed to a geo-altimetry. Territory configuration of the territory spatial model to be controlled for example in a planimetric-altimetric form or altimetric form and for altimetric section profiles.

[0044] In function of the environment priorities, spatial orientation of a sensor is programmed, and scanning frequency of zones and width of detection are determined.

[0045] Making reference to figure 1, method comprises the use of sensor 1. It is operated by means able to make them regular movements, i.e. a first rotation about a vertical axis 2 (an axis perpendicular to the ground) and a second rotation with respect to an axis perpendicular to the first one and to the laying direction. This second rotation moves the sensor of an α angle, preferably between 0° and 80° with respect to the position in correspondence of which the sensor is directed vertically toward the ground, so as to subject to scanning an essentially conical volume. Distance range within which tested sensor works corresponds to these limits.

[0046] Sensor tested in this embodiment was an infrared sensor that can be employed with any lighting condition. Furthermore, an optical sensor can be employed for monitoring the formation of queues along the roads, without that the diffusion of the relevant information can infringe the privacy rules, since it concerns temperature data that, being included in set interval and configuration ranges, indicate the presence of the same queues.

[0047] In order to efficiently treat the data, territory to be controlled is divided into scanning sectors.

[0048] Said scanning sectors can be differently chosen, but a particularly efficient choose, thus particularly optimising the detection, is that of dividing the scanning about the vertical axis in a pre-set number of angular sectors, each angular sector corresponding to the focal opening angle of the optical sensor.

[0049] It has been tested a division into 16 angular sectors, each one of $22,5^\circ$ with the above-mentioned

infrared sensor.

[0050] At the same time, second rotation has been divided into equal angular sectors, always in function of the focal opening of the sensor.

[0051] Instead, for the tested infrared sensor, 4 sectors, each one of 20°, have been chosen (zenithal movement).

[0052] A division of the territory to be subjected to scanning into corona circular sectors follows this choice, as shown in figure 1, said sectors becoming always larger departing from the sensor position.

[0053] Sensor is thus moved in such a way that it for example always is directed toward the centre of said corona circular scanning sectors.

[0054] Said division into corona circular scanning sectors only has an advantage for the scanning efficiency, but it is particularly advantageous for an easy reconstruction of the data on a map of the subjected to scanning territory.

[0055] Furthermore, in this way it is possible determining the movement time from one zone to another one, as well as the exact succession of the scanings.

[0056] In the system according to the invention, this advantage is correlated with a further coupling for motion.

[0057] In fact, sensor requires sometime for detecting an image corresponding to a scanning zone. After this time, system moves the sensor in such a way that it passes to the following corona circular sector.

[0058] The above can be particularly realised in such a way that motion starts in the processing local unit from the moment when the loading buffer is full.

[0059] Scanning modes are further such to maximise the tele-detection definition, frequency and precision of scanning where it is necessary for detecting meaningful events.

[0060] To this end, it is preferable making a preliminary atmospheric scanning, for preliminarily verifying critical atmospheric alterations (for example smokes, temperatures).

[0061] Said scanning can occur all along the volume defined by the above rotations, or only on part of it.

[0062] Individuation of critical volumes or areas, more generally of meaningful events can be made by a comparison of the standard image with the image detected of the micro zone temperatures.

[0063] Thus detections are preferably concentrated in correspondence of said critical volumes. It can be made both subjecting to scanning exclusively said volumes, and subjecting to scanning them with a higher frequency with respect to other volumes.

[0064] A local analyses of the detection site allows the recognition of the thermal events determining the alarm for example on the basis of critical levels set for temperature classes.

[0065] Individuation of the event position occurs by the polar co-ordinates obtained by the programming of the motion of the sensor on the azimuthal plane and on

the zenithal plane.

[0066] Controlled area is shown in figure 2, on a territory map.

[0067] Sensor employed is preferably an optical sensor, still more preferably an infrared sensor, remote detecting the temperature, preferably at a distance between 1 and 5 km. It is provided with predefinition of detectable thermal level that can be examined at time intervals by processing software.

[0068] For each scanning radial - annular cycle as described in the above, it is possible an initial calibration directing the sensor toward a reference point (or zone with very small dimensions) not too wherein it is provided another sensor controlling the temperature (or other physical parameter taken into consideration, for example relative humidity, luminosity and wind speed) of said point. In this way, at the beginning of each scanning cycle, detection is calibrated again and the following detection is reliable.

[0069] Making reference to figure 3, an embodiment of the apparatus according to the invention provides self-powered data detection fixed positions 100, and a central unit 200 processing the information transmitted to the fixed positions 100 placed on territory, by which interesting events are detected.

[0070] Information associated to each station comprise:

- position of the station (area/territory to be controlled), also identified by an identification number;
- integrated aero-photo-grammetric and satellite individuation of events;
- meaningful data and alarms;
- operative, didactic and informative notes;
- map with auxiliary sites (for example equipped with reachability, intervention devices, emergency shelters, first aid fixtures).

[0071] Besides the above maps, within the area to be monitored, maps containing information about themes concerning to the environment to be controlled and monitored with reference to the territory patrimony (theme maps), Said cartographies can also be configured with user interactive modes.

[0072] Control site 100 is comprised of a metallic support element at the top of which an outside, proof container (mainly a metallic container) and for example with a hemispherical shape; it is provided with a protection part on which possible photovoltaic panels could be inserted for electric supply of the system; within said container sensor 1, 1', 1'', motion robotics (not shown in the figure) and a local electronic processor 3, 3', 3'', can be housed.

[0073] It is further provided the presence of a modem 4, 4', 4'' for transmission of data detected by a fixed telephony or mobile telephone to the central processing unit 200, as well as emergency electric supply accumulators (not shown).

[0074] Receipt of data occurs in a receipt unit 7, that can be controlled by a control panel 8, receiving data both from sensors 1, 1', preferably thermal sensors, and from other sensors (for example one or more smoke optic sensors 11, one or more multicriteria sensors 12, for example integrated multicriteria sensors anti-vandalism, smoke and temperature).

[0075] These data are transmitted to the switching unit 6, sending the data to the processors 5, 5' included in the processing central unit 200 (by the gateway divider 23 and protocol converter gateways 22) and/or stores them into a local and/or remote storing memory 9.

[0076] Each control site 100 can take advantage of a possible laser laying system, for controlling the proper sensor 1, 1', 1" laying.

[0077] Territorial positioning of control sites 100 is made according to a preordained geometric matrix with linked nodes.

[0078] Total control of site is assigned to a self-diagnosis software for periodic control of the proper operation of the site in robotics motion and data transmission.

[0079] It is further possible the implementation of auxiliary control devices for controlling for example microclimate, hydrothermal, water bed, anti-vandalism, smokes, atmosphere, sun radiation.

[0080] Detection sites can control as an average a circular surface of about 300 hectares and their position on territory must be configured on the basis of local environmental control strategies (pattern, linear, punctiform extension); functionality of a system of stations is co-ordinated in progression of scannings.

[0081] As described in the above, scanning of territory surface occurs by concentric radial - annular motion of the tele-detection thermal sensor 1.1'. 1".

[0082] Meaningful data of the event are transmitted by mobile telephone (for example optical fibre, fixed telephony, GSM, GPRS or UMTS, or other telecommunication system): they concern thermal entity of the event, detected image and polar co-ordinates of the event with respect to the emitting site individuated by an identification code.

[0083] Before the control central unit 200, by the reception of the above data, sent from a site 100, superimposition is displayed on the monitor of the positioning of the event on the 2D thematic cartography prepared in order to intelligible individuation and interpretation of the event generating the alarm.

[0084] By said processing, progressive cognitive deepening steps can be carried out:

1. simple cartographique individuation;
2. representation of paths allowing the preferential reachability as far as time and best access are concerned ;
3. transmission of informative messages, visualisation of sites and of intervention and support means kind available, close to the event.

[0085] Periodic collection of total data is memorised in a suitable hardware file. Said collection could be used for statistic, preventive, environmental, and hydro geological applicative extensions.

[0086] Apparatus described is thus addressed to the informatised territorial control for multifunction monitoring, particularly hydrothermal, anti-fire, road safety and environmental safety monitoring.

[0087] A very important particular application is detection and monitoring of ice on the road. In fact, by the system according to the invention, it is possible detecting temperature of a scanning zone and, thanks to an auxiliary sensor, also the relative humidity in said scanning zone.

[0088] By using these data in combination with the known Glaser diagram, presence of ice on the ground can be inferred in function of the calculation of condensation (dew temperature) phenomenon, of steam contained in atmosphere, of surfaces subjected to scanning.

[0089] It is further possible calibrating before the infrared sensor using the relative humidity data.

[0090] Particularly, it is allowed the use of devices provided with energetic autonomy, for local processing of environment and spatial meaningful data for detecting of events to be monitored, such as safety, anti-fire, territory, hydrogeology, environmental alterations, microclimate.

[0091] Finally, use of the apparatus according to the invention (informatised and automatised territory environmental monitoring) can create with passing of time a strategic data file for environmental monitoring.

[0092] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims,

Claims

1. , Method for detecting and monitoring events on a territory, comprising the use of at least a directional sensor (1) and at least a relevant device for moving said directional sensor (1) for cyclically scanning the territory, **characterised in that** each scanning cycle of territory comprises the motion of said at least one directional sensor (1) with a first rotation about a vertical axis (2) of an angle between 0° and 360° and a second rotation of an angle (α) between 0° and 90° about horizontal axis perpendicular to the laying direction of said at least one directional sensor (1), the method comprising a preliminary step during which divides said first rotation in a first number of first angular sectors and said second rotation in a second number of second angular sectors so as to divide the territory into corona circular

- sectors, each scanning cycle comprising the motion of at least one directional sector (1) so as to direct it later toward one or more of said corona circular sectors, detection of an event occurring by comparison of detected instantaneous values with an assembly of reference values for one or more chemical-physical parameters in said territory.
2. Method according to claim 1, **characterised in that** said second rotation is a rotation of an angle (α) between 0° and 80°.
 3. Method according to claim 1 or 2, **characterised in that** said first angular sectors are identical angular sectors.
 4. Method according to claim 3, **characterised in that** said first identical angular sector correspond each to an angle corresponding to the focal opening of one of said at least one directional sensor.
 5. Method according to one of claims 1-4, **characterised in that** said second angular sectors are identical angular sectors.
 6. Method according to claim 5, **characterised in that** said second identical angular sector correspond each to an angle corresponding to the focal opening of one of said at least one directional sensor.
 7. Method according to one of claims 1-6, **characterised in that** it comprises a preliminary scanning, carried out at regular intervals, for individuating alterations of pre-set chemical-physical parameters with respect to said reference values, said one or more corona circular sectors comprising the sectors wherein said alterations have been individuated.
 8. Method according to claim 7, **characterised in that** during each scanning cycle, said one or more corona circular sector are subjected to scanning with a resolution higher than the preliminary scanning.
 9. Method according to one of claims 1-8, **characterised in that** said at least one directional sensor is each time directed toward the centre of said corona circular sectors.
 10. Method according to one of claims 7-9, **characterised in that** corona circular sectors wherein alterations of pre-set parameters have been individuated are subjected to scanning with a higher frequency than the other sectors.
 11. Method according to one of claims 1-10, **characterised in that** the method comprises the use of one or more not directional sectors.
 12. Method according to claim 11, **characterised in that** it comprises a preliminary step wherein said at least one directional sensor is calibrated measuring a chemical-physical parameter of a pre-set territory remote zone at the ground level or above the ground level, said chemical-physical parameter being also measured by said at least one not directional sector provided close to said remote point.
 13. Method according to one of claims 1-12, **characterised in that** at least two directional sensors are moved, for example a standard telecamera and an infrared thermo-camera.
 14. Method according to one of claims 1-13, **characterised in that** individuation of the position of a detected event occurs by the polar co-ordinates obtained by the programming of the sensor motion.
 15. Method according to one of claims 1-10, **characterised in that** positions of detected events are displayed overlapping the same on a bi-dimensional territorial map, reconstructing on said map said corona circular sectors.
 16. Apparatus for detecting and monitoring events on a territory, comprising a data detection fixed site (100), provided with at least a directional sensor (1, 1', 1''), **characterised in that** it implements the method according to one of the claims 1-15.
 17. Apparatus according to claim 16, **characterised in that** said at least a directional sensor (1, 1', 1'') is an optical sensor, particularly an infrared sensor.
 18. Apparatus according to claim 17, **characterised in that** said at least one directional sensor (1, 1', 1'') is a variable focal sensor.
 19. Apparatus according to one of claims 16-18, **characterised in that** said at least one directional sensor (1, 1', 1'') is a temperature sensor.
 20. Apparatus according to one of claims 16-19, **characterised in that** said fixed control site comprises a metallic support element at the top of which a container (mainly a metallic container) is housed, within which said at least one directional sensor (1, 1', 1'') as well as a motion robotics for said sensor (1, 1', 1'') are provided.
 21. Apparatus according to claim 20, **characterised in that** said support element are provided with electric self-supplying photovoltaic panels.
 22. Apparatus according to one of claims 16-21, **characterised in that** the apparatus comprises one or more not directional sensors.

23. System for detecting and monitoring events on a territory, **characterised in that** it comprises one or more apparatuses according to one of claims 16-22, the system further comprising a central unit (200) processing the information received from said one or more detection sites (100). 5
24. System according to claim 23, **characterised in that** each one of said one or more sites comprises a local processor (3, 3', 3'') suitable to carry out a pre-processing of the meaningful data to be transmitted to the central processing unit (200). 10
25. System according to claim 24, **characterised in that** transmission of said meaningful data occurs by a detection data transmission modem (4, 4', 4'') provided in each site. 15
26. System according to claim 25, **characterised in that** said transmission occurs by a fixed telephony or by mobile telephones. 20
27. System according to claim 23, **characterised in that** said meaningful data are received by a receiving unit (7). 25
28. System according to claim 27, **characterised in that** said meaningful data are transmitted by the receiving unit (7) to a data switching unit (6), sending the data to the central unit (200) comprising at least one electronic processor (5, 5') and/or storing them within a storage memory (9) in function of detection of events on territory. 30
29. System according to one of claims 23-28, **characterised in that** each one of said one or more control sites comprises a laser laying system for controlling the proper scanning of said at least one sensor (1, 1', 1''). 35
30. System according to one of claims 23-29, **characterised in that** territory positioning of the control sites can be made according to a preordained geometric matrix with linked nodes. 40
31. System according to one of claims 23-30, **characterised in that** the system comprises at least one installation comprising a surface monitored by at least one local sensor with respect to one or more chemical-physical parameters, said surface being suitable to be monitored by said at least one directional sensor (1, 1', 1'') at pre-set time instants. 45

55

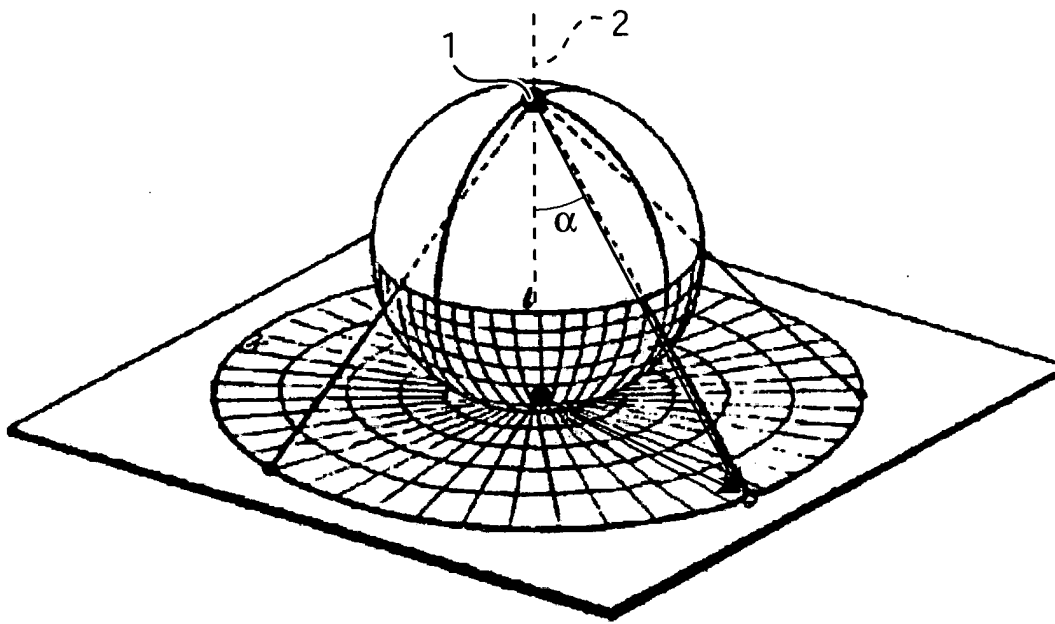


Fig.1

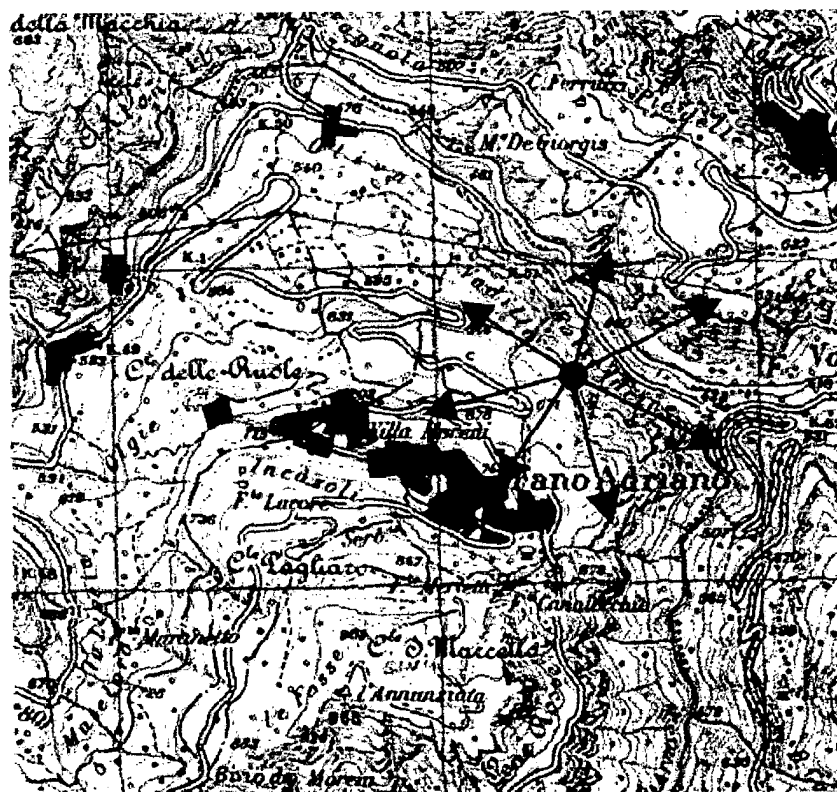


Fig.2

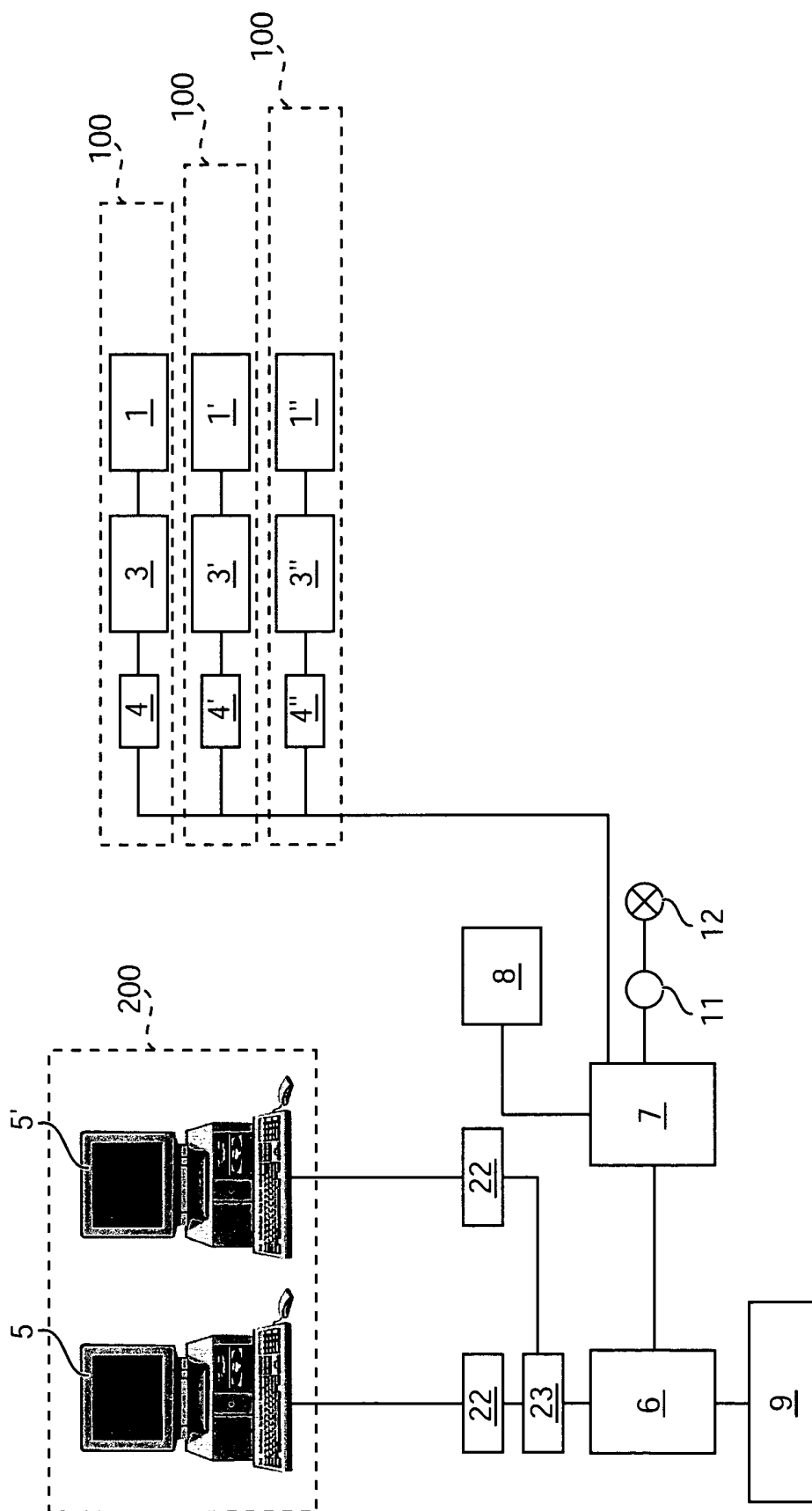


Fig. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5156

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 5 734 335 A (BROGI ET AL) 31 March 1998 (1998-03-31) * abstract *	1-31	G08B17/12
X	DE 37 10 265 A1 (LICENTIA PATENT-VERWALTUNGS-GMBH) 13 October 1988 (1988-10-13) * abstract; figures 1-3 *	1-31	
X	US 4 567 367 A (BROWN DE COLSTOUN ET AL) 28 January 1986 (1986-01-28) * abstract *	1-31	
A	WO 2004/008407 A (GS GESTIONE SISTEMI S.R.L; BERTI, UMBERTO) 22 January 2004 (2004-01-22) * abstract *	1-31	
A	EP 0 611 242 A (EMPRESA NACIONAL BAZAN DE CONSTRUCCIONES NAVALES MILITARES S.A) 17 August 1994 (1994-08-17) * abstract *	1-31	
A	EP 0 432 680 A (FUJITSU LIMITED) 19 June 1991 (1991-06-19) * abstract *	1	
A	FR 2 598 238 A (LATECOERE STE INDLE AVIATION) 6 November 1987 (1987-11-06) * abstract *	1	
A	DE 39 27 583 A1 (THOMSON-TRT DEFENSE, GUYANCOURT, FR) 6 March 1997 (1997-03-06) * abstract *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			G08B
Place of search		Date of completion of the search	Examiner
The Hague		3 June 2005	Sgura, S
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			

1
EPO FORM 1503 03/82 (P04C01)

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

EP 05 42 5156

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-06-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5734335	A	31-03-1998	IT 1237262 B	27-05-1993
			AT 142039 T	15-09-1996
			BR 9007134 A	17-12-1991
			CA 2047190 A1	21-06-1991
			DE 69028296 D1	02-10-1996
			DE 69028296 T2	24-04-1997
			WO 9109390 A1	27-06-1991
			EP 0458938 A1	04-12-1991
			ES 2094807 T3	01-02-1997
			GR 3021588 T3	28-02-1997
			PT 96268 A ,B	30-09-1992
DE 3710265	A1	13-10-1988	NONE	
US 4567367	A	28-01-1986	FR 2541484 A1	24-08-1984
			AT 41539 T	15-04-1989
			AU 576746 B2	08-09-1988
			AU 2314784 A	19-07-1984
			CA 1229143 A1	10-11-1987
			DE 3477285 D1	20-04-1989
			EP 0117162 A1	29-08-1984
			ES 8407349 A1	01-12-1984
			GR 79473 A1	30-10-1984
			MA 20004 A1	01-10-1984
			PT 77948 A ,B	01-02-1984
WO 2004008407	A	22-01-2004	WO 2004008407 A1	22-01-2004
			AU 2002329039 A1	02-02-2004
			BR 0215800 A	01-03-2005
			CA 2492360 A1	22-01-2004
			EP 1523738 A1	20-04-2005
EP 0611242	A	17-08-1994	ES 2070710 A2	01-06-1995
			AR 248461 A1	18-08-1995
			BR 9400391 A	23-08-1994
			CA 2115179 A1	11-08-1994
			DE 69421200 D1	25-11-1999
			DE 69421200 T2	24-08-2000
			EP 0611242 A1	17-08-1994
			GR 3032439 T3	31-05-2000
			PT 611242 T	28-04-2000
			US 5557260 A	17-09-1996
EP 0432680	A	19-06-1991	JP 3182185 A	08-08-1991
			DE 69022959 D1	16-11-1995
			EP 0432680 A1	19-06-1991

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

EP 05 42 5156

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-06-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0432680 A		US 5133605 A	28-07-1992
FR 2598238 A	06-11-1987	EP 0298182 A1	11-01-1989
		FR 2598238 A1	06-11-1987
DE 3927583 A1	06-03-1997	FR 2736235 A1	03-01-1997