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

(11) EP 1 662 452 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
**31.05.2006 Bulletin 2006/22**

(21) Application number: **04766909.8**

(22) Date of filing: **07.08.2004**

(51) Int Cl.:
***G08B 13/12*** *(1968.09)*

(86) International application number:
**PCT/ES2004/000370**

(87) International publication number:
**WO 2005/015517 (17.02.2005 Gazette 2005/07)**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **07.08.2003 ES 200301917**

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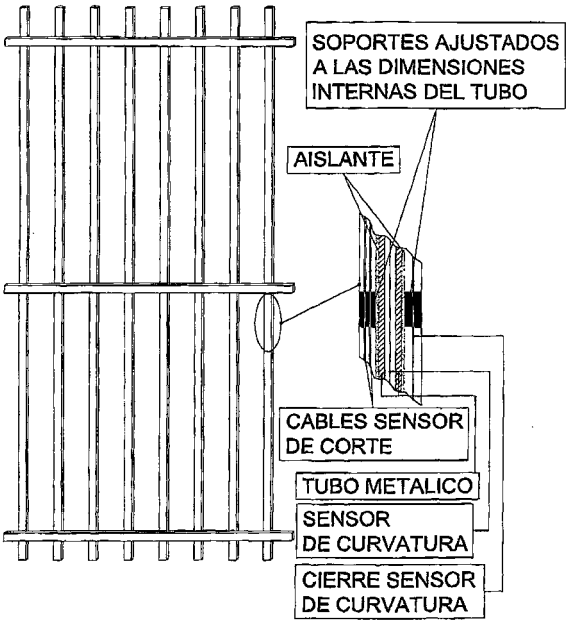
(54) **SENSORIZED OR INTELLIGENT SECURITY FENCE OR GRILLE**

(57) The invention relates to a sensorized or intelligent security fence or grille. According to the invention, the interior of the electrically-conductive plastic or metallic fence, grille or structure is sensorized by means of an electric conducting wire. In this way, a variation in the state of the circuit (normally open or normally closed) is detected by the alarm centre to which it is connected. The inventive structure can be mounted in the form of fences delimiting properties, grilles in hollow walls, sensorized decorative elements between double glazing panels or in any other form, since the claim related to the sensor unit regardless of the form or size obtained through the combination of individual sensors. As can be seen, the aforementioned type of sensor is not prone to failure given that it does not contain any active elements that could be altered owing to variations in temperature. Moreover, the inviolability of said sensor is ensured without being detected since variations in the form of the structure are detected regardless of whether they occur slowly or suddenly, using plastic, gaseous or metallic materials, and regardless of the angle of intrusion.




CORTE TRANSVERSAL DE VERJA

EP 1 662 452 A1

## Description

### OBJECT OF THE INVENTION

**[0001]** To prevent and detect the attempt to exit or enter the enclosed areas protected by means of this system prior to the unauthorized action taking place.

### BACKGROUND OF THE INVENTION

**[0002]** Different currently-existing patents (stated hereinbelow) having been reviewed, some thereof were found to bear certain similarities to the invention presented herein, however entailing some fundamental differences.

**[0003]** DE 2802903 is a pneumatic system which does not detect minor longitudinal deformations.

**[0004]** FR 2603323 is an uninsulated mechanical/electrical system, current leakage thus being a possibility, and the bars can be cut using electrically-insulating materials (i.e. radial saw, cut-off torch, etc.) without being detected, and it has no continuity detection.

**[0005]** FR 2566831 is a passive (mechanical) system with a revolving inner cylinder.

**[0006]** BE 879799 is a pneumatic/hydraulic system. It would not detect minor changes in the bars.

**[0007]** DE 2927926 is a hydraulic/mechanical system with a glass bulb which, when broken, modifies the pressure inside the structure.

**[0008]** DE 4318723 is a system with weakened bars and an uninsulated electrical system, it being possible for the bars to be cut without being detected.

**[0009]** EP 0073934 is a system based on the metal expansion and flexibility coefficient differential. This system may undergo have operating faults, depending on the temperature to which the fence or grille is subjected.

**[0010]** EP 0087076 is a system based on resistive variations, which, compared to ours, would give rise to faults with regard to occasional temperature-induced resistive variations.

**[0011]** GB 2098770 is a system based on optical fiber conductors with generators and receivers. This system would not detect the minor deformations, and the active elements would be subjected to major temperature changes, with the resulting damage thereto.

**[0012]** DE 3632111 is a vibration-detection system attachable to any metal structure. Compared to the system presented herein, this system has been found to generate false alarms due to impacts and does not detect cuts or curvatures in the structure.

**[0013]** US 4922228 is a fiber optics system which does not detect minor curvatures in the fence or grille.

**[0014]** IT 1126241 is a fluid pressure-based system and does not detect minor deformations.

**[0015]** DE 3503973 is a fluid pressure-based system and does not detect minor deformations.

**[0016]** DE 4337824 is a system containing a steel cylinder inside reinforcing the structure but does not detect deformations or cuts.

**[0017]** DE 19815764 is a fluid pressure-based system and thus does not detect minor deformations in the structure.

**[0018]** CN 1277308 is an electrical induction system which may cause false alarms resulting from sudden temperature changes or changes in the frequency generator.

**[0019]** GB 2194371 is a fiber optics wiring-based system. This system could not detect minor deformations.

**[0020]** EP 0118698 is a system based on internal photocells. This system would generate false alarms caused by temperature changes or high temperatures.

**[0021]** WO 9726517 is a fiber optics wiring-based system. This system could not detect minor deformations.

**[0022]** WO 9726517 is a fiber optics wiring-based system. This system could not detect minor deformations.

**[0023]** DE 3306002 is a system based on a light transmitter and receiver. This system would not detect minor deformations in the structure and would cause Faults generated by high temperatures.

### DESCRIPTION OF THE INVENTION

**[0024]** The invention is a fence or grille housing a curvature detection system adapted to the needs of the customer, detecting, for example, from 3 mm, the deformation of the longitudinality of the bar and a cut detection system which detects said cut independently of whether made with metal material (saw), insulating material (abrasive discs) or gaseous material (cutting torches).

**[0025]** The tube forming the structure of the fence or grille may be either square, round, rectangular, pentagonal, with narrower or wider sections, etc. Any shape of tube or structure will be suitable, the use of sensors on the interior thereof being absolutely essential.

**[0026]** The metal structure of the fence or grille is to be hermetically sealed and is protected from rusting inside by means of the use of small deposits of mositure-proofing salts or the use of a dry-air circuit (i.e. with pressurizer) depending upon the intended use of each fence or grille.

**[0027]** The cut-off and curvature sensors are used for the purpose of detecting the deformations and cuts prior to full completion of these acts, ensuring the inviolability of said fences or grilles without being previously detected as such.

**[0028]** The cut-off sensor is to always be activated prior to cutting the bar, the structure of the fence or grille being protected and set to activate the alarm before the tampering is completed.

**[0029]** The curvature sensor shall be of a diameter which will depend upon the desired sensitivity thereof (i.e. with an inner diameter of 6 mm, the bars may deform up to 3 mm before activating the sensor).

**[0030]** The set of sensors works on minimum voltages and current strengths.

**[0031]** The set of sensors is insulated from the structure of the fence or grille by means of a Teflon support

and encapsulated in heat-resistant insulating material. This structure is grounded to prevent accidental electrical shocks.

**[0032]** Given the type of construction of the fence and sensors, the sensors could be activated in all cases upon curving, it being important to stress that it is not necessary for the cutting to be done using metal tools. The cut-off will always be detected even when using tools of insulating material.

**[0033]** The wiring system necessary for the wiring of the different sensors to be installed are to be run through the inside of the fence or grille proper to any of the floor or wall-attachment pins through which it is decided to run the wiring. The wires used are to be heat-resistant.

**[0034]** Given the characteristics of the invention, it is important to stress than any attempted cut-off will be detected by the sensor, independently of the direction and angle thereof, given that the cutting action is safeguarded against by means of an electric circuit.

Description of the sensors (Refer to drawings)

**[0035]** Cut-off sensor: To be comprised of a cable insulated electrically from metal structure by means of an insulating casing made of fiberglass or any other insulating material which will withstand high temperatures, forming a continuous circuit. This sensor would operate in normally closed state (No. 9).

**[0036]** Curvature sensor: To be comprised of a metallic tube (No. 5) of an inner diameter to be determined by the desired curvature sensitivity to be used. The ends of the tube have some heat-resistant, insulating material closures (No. 4), a metal wire running through said closures or caps through the center of the diameter of the tube and along the full length thereof (No. 7). A tightening spring is used at one of the ends of the sensor to keep the wire taut and uncurled. The entire assembly is encapsulated in insulating material (No. 6). The sensor fits up to the inner structure of the fence by means of insulating material supports installed a maximum of every 50 mm (No. 3).

## Claims

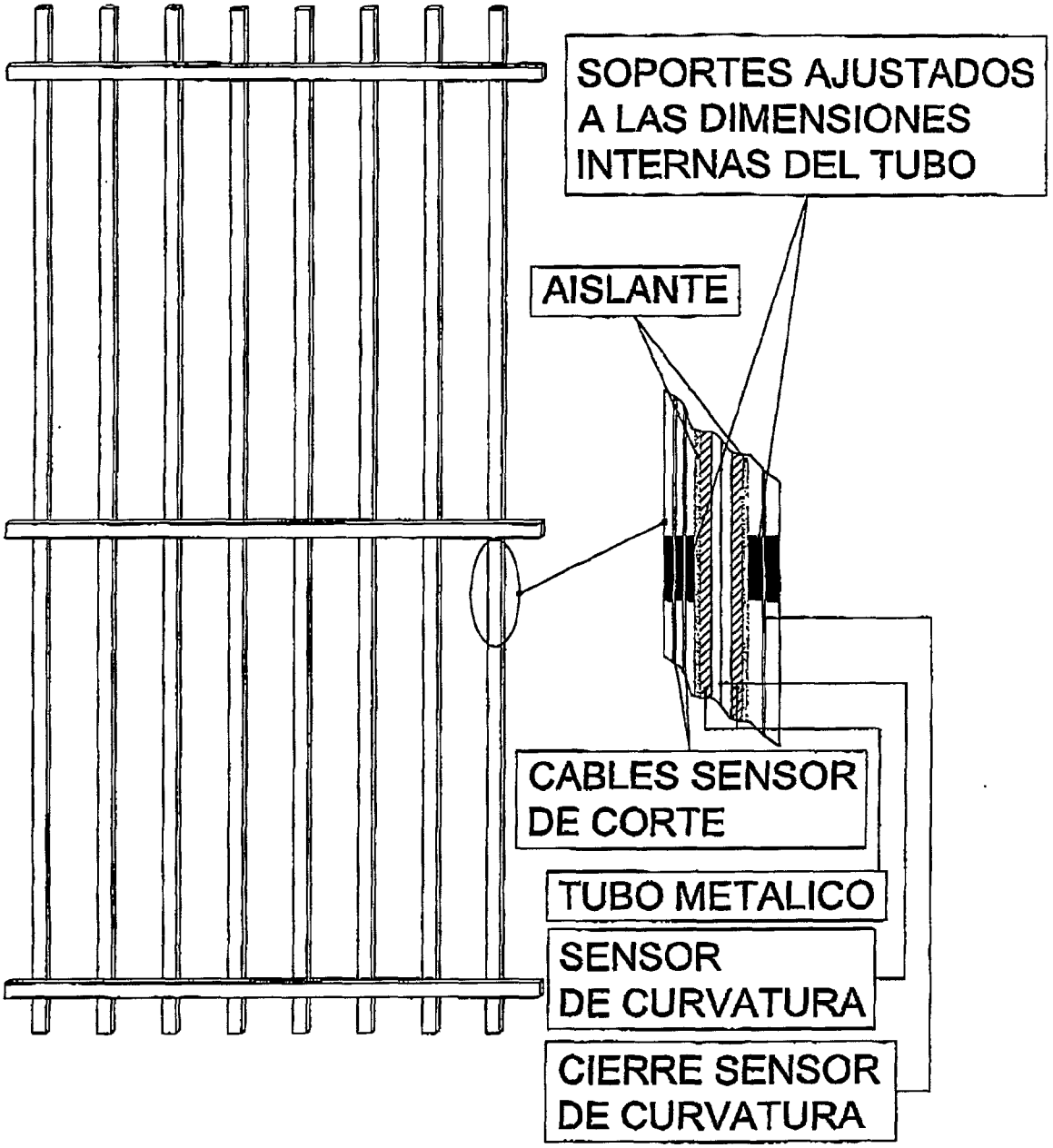
1. The metallic structure of the fence is hollow, perfectly well-insulated cut-off and curvature sensors being housed inside thereof (the cut-off sensor with fiberglass casing for withstanding temperatures without any danger of current leaks and the curvature sensor, encapsulated in heat-resistant plastic with supports for attachment to the inner Teflon structure). The fact of keeping the sensors insulated avoids the danger of current leakage into the structure.

2. The curvature sensor is comprised of a metallic tube which runs through the inside of the fence structure, an uncoated metal wire running through the center of the sensor tube, making contact with the same upon curving. The accessibility of the sensor is determined by the inner diameter of the sensor tube and the outer diameter of the wire running through the inside thereof. Example: a sensor tube with an inner diameter of 10 mm would detect curvature at 5 mm, given that the wire is installed in the center and secured at the ends and held taut by a spring by gravity or by any other system. The sensor wiring connections are made using encased, leakproof wire. The lower end of the curvature sensor wire is connected to the upper top, one single cable being run from this junction, forming a circuit with another wire which is run out of the sensor tube. When a curvature takes place in the tube, on the sensor wire remaining straight, this open circuit would touch the curved part of the tube, closing the circuit and setting off the alarm. This sensor would also detect cut-off given that, the sensor wire would drop out, a crumpling taking place coming into contact with the sensor tube.

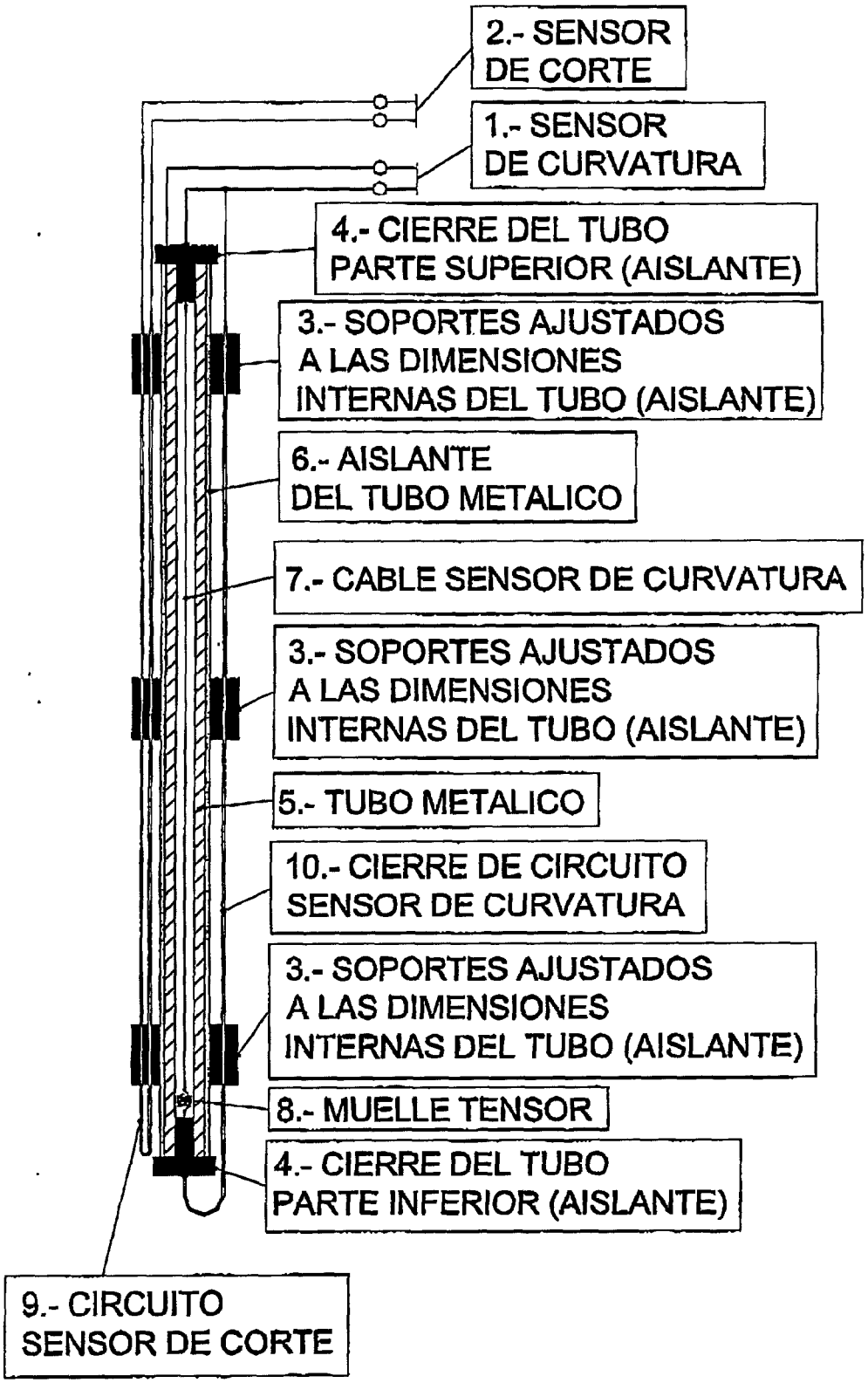
3. Cut-off sensor: Comprised of a wire inside in fiberglass casing for withstanding high temperatures without danger of leaks. This cable is installed inside the fence or grille structure, running throughout the entire structure and forming a closed circuit.

4. When connected to an alarm or detection system, this circuit operates on normally closed circuit. When any break occurs therein, the detection system would be activated.

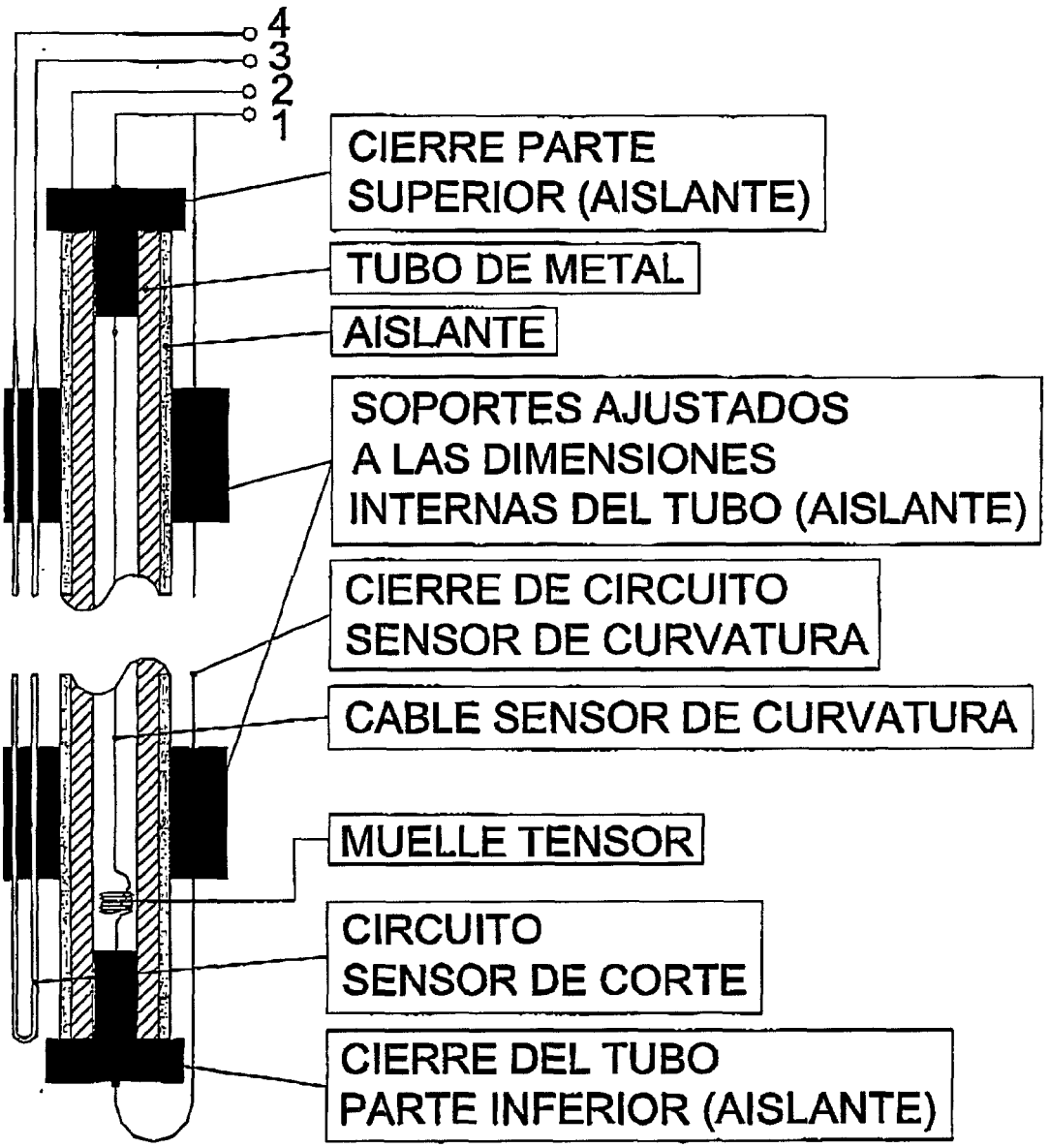
5. Given the characteristics of the invention, the wiring is done to the alarm tamperproof system, as a result of which the zone actuation cannot be overlooked.




CORTE TRANSVERSAL DE VERJA



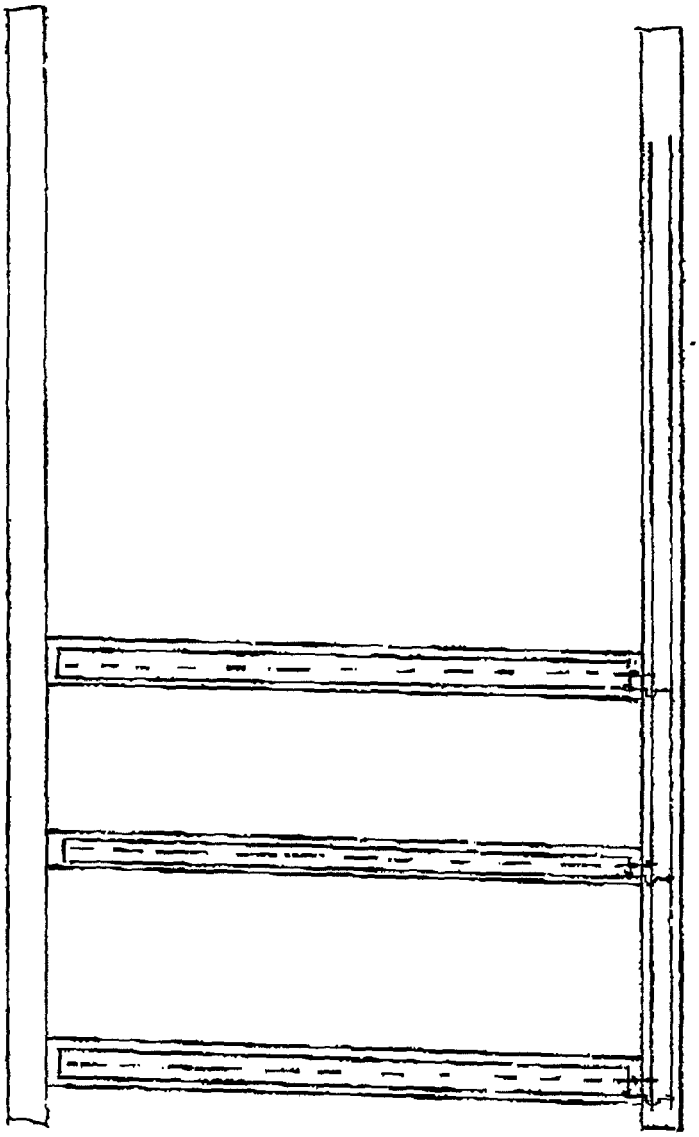

SENSOR DE CORTE Y CURVATURA




NOTA

- CIRCUITO 1 Y 2 NORMALMENTE ABIERTO

- CIRCUITO 3 Y 4 NORMALMENTE CERRADOS



SUPPORTS SUITED TO THE INNER DIMENSIONS FO THE TUBE

INSULANT

CUT-OFF SENSOR CABLES

METALLIC TUBE

CURVATURE SENSOR

CURVATURE SENSOR CLOSURE

FENCE CROSS-SECTION

2. CUT-OFF SENSOR

1. CURVATURE SENSOR

4. UPPER TUBE CLOSURE (INSULANT)

3. SUPPORTS ADAPTED TO THE INNER DIMENSIONS OF THE TUBE (INSULANT)

6. METALLIC TUBE INSULANT

7. CURVATURE SENSOR WIRE

3. SUPPORTS ADAPTED TO THE INNER DIMENIONS OF THE TUBE (INSULANT)

5. METALLIC TUBE

10. CURVATURE SENSOR CIRCUIT CLOSING

3. SUPPORTS ADAPTED TO THE INNER DIMENSIONS OF THE TUBE (INSULANT)

8. TIGHTENING SPRING

4. BOTTOM TUBE CLOSURE (INSULANT)

9. CUT-OFF SENSOR CIRCUIT

CUT-OFF AND CURVATURE SENSOR

UPPER CLOSURE (INSULANT)

METALLIC TUBE

INSULANT

SUPPORTS ADAPTED TO THE INNER DIMENSIONS OF THE TUBE

CURVATURE SENSOR CIRCUIT CLOSING

CURVATURE SENSOR CABLE

TIGHTENING SPRING

CUT-OFF SENSOR CIRCUIT

BOTTOM TUBE CLOSURE (INSULANT)

**NOTE**

- CIRCUITS 1 & 2: NORMALLY OPEN
- CIRCUITS 3 & 4 : NORMALLY CLOSED

## INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2004/000370

A. CLASSIFICATION OF SUBJECT MATTER

IPC[7] G08B13/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7] G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT,EPODOC, WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | GB 2 205 884 A (Hercules) 21.12.1988<br>**the whole document** | 1- |
| A | EP 0 244 824 A2 (MAGAL) 11.11.1987<br>**the whole document** | 1 |
| A | GB 2 062 321 A (Fensecure) 20.05.1981<br>**the whole document** | 1 |

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| **14 December 2004 (14.12.2004)** | **23 December 2004 (23.12.2004)** |
| Name and mailing address of the ISA/<br>**S.P.T.O.**<br>Facsimile No. | Authorized officer<br>Telephone No. |

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**INTERNATIONAL SEARCH REPORT**
Information on patent family members

International Application No
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Form PCT/ISA/210 (patent family annex) (July 1992)