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(54) **Alarm console with bidirectional communication through TCP/IP and POTS and cell phone backup**

(57) Alarms console with bi-directional communication through TCP/IP with a control station that allows changing the operational parameters of the station without having to travel to it, also being provided with a software allowing to manage dynamic IP's, with three communication paths, channels or means (TCP/IP, GSM/GPRS and STN) which act successively in case of failure according to a pre-established order, also being provided with means for supervising and monitoring the communication paths from the console itself and from the receiver to the transmitter. In addition, the console can operate as a data transmission device acting as an interface for a signal generator.

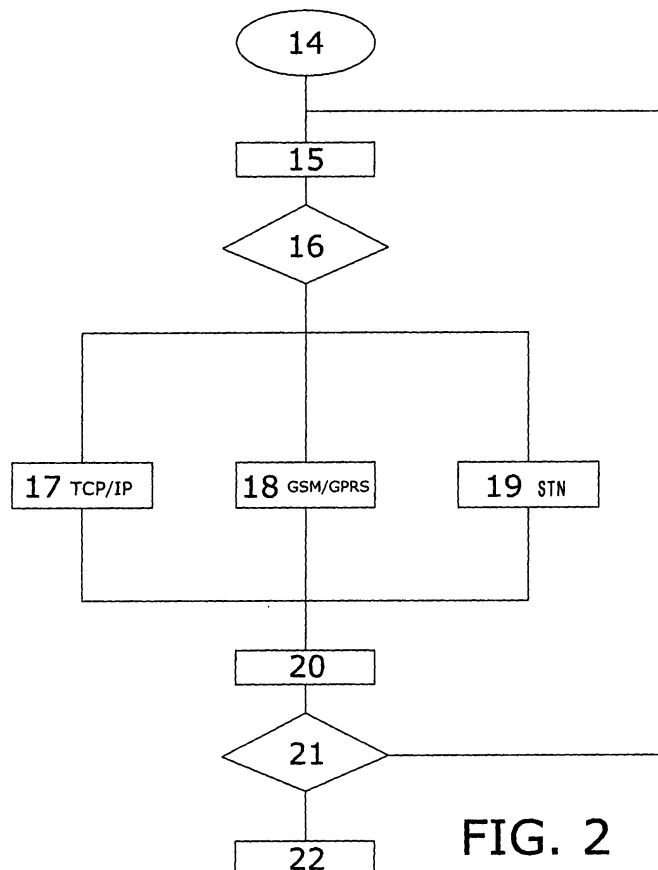


FIG. 2

Description

OBJECT OF THE INVENTION

[0001] The object of the present invention is an alarms console with bi-directional communication through TCP/IP with a control station, allowing to modify any operational parameter of the console so that it is not necessary to travel to the equipment.

[0002] The present invention is characterised in that, in addition to the TCP/IP communication path, it has other communication paths of a different nature, used according to a predetermined order as the paths programmed to be used first fail.

[0003] The present device is also characterised by having means for monitoring and supervising the state of the transmission paths, means or channels provided in the device.

[0004] Monitoring or supervision of the transmission paths is performed both from the alarms console to the receiver and from the receiver to the alarms console.

[0005] In addition, the alarms console object of the invention has a management software that can operate with dynamic (i.e. changing) IP addresses.

[0006] Therefore, the present invention lies in the field of data transmission equipment.

BACKGROUND OF THE INVENTION

[0007] Alarms consoles available in the market suffer from some of the drawbacks described below:

[0008] On one hand, some consoles have a single transmission path, so that their correct operation depends on the state of the communications path.

[0009] Another situation that arises often is that the transmission channel or means available to the alarms console does not have any means to supervise the state of the communication channel allowing to discover a communications failure, so that when it is necessary to transmit information it may never be transmitted.

[0010] If the transmission is performed over the TCP/IP network, a common drawback is that IP addresses are dynamic, this is, they change with a considerable frequency, making it impossible to communicate any events.

[0011] It is the case that alarms consoles have bi-directional communication through the STN, with the difficulties implied in such connection, such as busy lines or frequent interruptions, or the cost of the communication.

[0012] Therefore, the object of the present invention is to develop an alarms console that overcomes the aforementioned drawbacks, for which purpose it should have:

- several communication paths, means or channels of different nature that do not condition the success of transmission to the state of a single transmission means;
- bi-directional communications with a control station by means other than STN and that allows modifying the operation parameters of the console, without requiring to travel to its location and at no cost;
- software ensuring management of dynamic IP's, so that when these change the success of the transmission is not compromised;
- means for supervising the transmission paths, means or channels such that it alerts of any inoperative means.

DESCRIPTION OF THE INVENTION

[0013] The invention disclosed for an alarms console with bi-directional communication with a control station has the following constructive and operational characteristics.

[0014] On one hand, the alarms console has three communication paths used in succession according to a previously programmed order, so that when one path fails the next one is used.

[0015] The communication paths used by the device are: Internet connection through TCP/IP; Switched Telephone Network; and Dual 900 / 180 MHz GSM or GPRS (General Packet Radio System) Modem.

[0016] The use of one means or another will depend on availability and on the programmed transmission order.

[0017] On another hand, in addition to performing the transmission through one of the three paths, the alarms console supervises the state of the three communication means continuously, thereby applying the principle of transmitting through the quickest and least costly path. The purpose of the communication means supervision is to save time, so that in the case that data must be transmitted it is not necessary to establish useless connections using paths that are not currently in good state.

[0018] The transmitted signals are received in the corresponding receiver group (TCP/IP, STN or GSM/GPRS), which decode the signal to leave it as it was originally, being provided with configurable outputs to allow incorporating these signals later to a data processing program.

[0019] In addition to the signals pertaining to its nature, the alarms console also sends the state of the telephone line, connection by GSM/GPRS or by Internet through TCP/IP.

[0020] When the alarms console is in standby state, with no alarms to transmit, the device will be busy checking the state of the communications means: telephone line, GSM/GPRS modem and Internet connection.

[0021] If a failure is detected in the telephone line (STN) the device will deliver information on the state of the line using the TCP/IP network or by GSM, according to the previously programmed order.

[0022] If a failure is detected in the GSM/GPRS connection, the state of the line will be delivered by TCP/IP or STN, according to the programmed order.

[0023] Finally, if the failure is detected in the TCP/IP connection, the device will deliver the state information by STN or GSM/GPRS, as established.

[0024] The alarms console object of the invention can also act as an interface for data transmission, so that it is possible to connect a signal generator to it, in charge of generating data that are transmitted by the alarms console through one of the communication channels provided. For this reason, the alarms console can be described as acting as an interface between the signal generator and reception equipment.

[0025] In the case of a failure in the signal generator the telephone line will be unhooked by it, which will be detected by the data transmission system as follows:

- the alarms console, acting as a transmission device, is left transparent to lend its own line to the signal generator;
- the alarms console will provide the data generator with the invitation tones, the latter dumping the information code, optionally in ID format;
- finally, the alarms console acts as a transmission device, disconnecting from the generator and leaving it in standby mode.

[0026] From this moment onward, the alarms console acting as a transmission device has all the information in ID format, and sends it to a decoder through TCP/IP.

[0027] If at the time of delivery of the data the TCP/IP connection is not available, the alarms console will allow delivery by STN to the Telephone Reception Switchboard.

[0028] Finally, if these two communication means are not available, the alarms console, acting as a transmission device, will send the information using the GPRS/GSM modem to a GSM/GPRS receiver which, as the Aifos decoder, is provided with a serial output for connection to a PC or data processing software.

[0029] Connected to the alarms console are the receiver devices of the Aifos TCP/IP Decoder for TCP/IP, Telephone Receiver for STN or GSM/GPRS receiver for GSM/GPRS. The TCP/IP receivers shall be provided with a TCP Modem that receives the connection request and reply to it, receiving the coded information in the encapsulation performed in the TCP/IP protocol, in ID and 4+2 Express format.

[0030] The alarms console can send three test signals periodically, one for each type of line to which it is connected. The line tests for each line shall be performed with a specific frequency, according to the type of line. The line state test shall be performed for the three communication means (TCP/IP, STN, GSM/GPRS) according to programmable periods for each one.

[0031] When data is transmitted from the alarms console, the data will be transmitted by one of the three means according to a previously programmed order:

- through the TCP/IP connection
- through the switched telephone network, STN
- through GSM/GPRS.

[0032] If one of the three communication paths is not operative, data indicating the line state are also generated. The following situations can arise:

- In case of failure of the TCP/IP connection, the TCP/IP connection failure is transmitted through STN or GSM/GPRS, as determined;
- In case of failure of the Switched Telephone Network, the failure signal is transmitted through TCP/IP or GSM/GPRS, as determined
- In case of failure of the GSM/GPRS connection, the failure is transmitted through TCP/IP or STN.

[0033] The alarms console test can be performed in both directions:

- Either sending a test signal from the console to the receiver, through control signals sent by TCP/IP;
- Or from the receiver to the console, using receiver control software that triggers a call to the transmitter to make it

reply, checking that it is in good state, through a TCP/IP connection with a variable periodicity, alerting of failed connections and refreshing the alert in each period.

[0034] The line state test performed by the alarms console is executed in both directions, either sending a test signal to the receiver or by the control software triggering a call to the transmitter to make it reply and check its correct state.

[0035] The alarms console object of the invention comprises:

- A CPU with a microprocessor that controls all processes performed by the alarms console;
- A TCP module, in charge of Internet, ADSL or Local Area Network connections between the device and an Aifos decoder.
- A GSM/GPRS modem in charge of communications between the transmission device and the GSM/GPRS receiver through the Data Channel;
- A telephone dialler for autonomous transmission through RTC.

[0036] In addition, the device has a bi-directional communications system through TCP/IP with a control station, so that it is possible to add, modify or delete operational parameters such as a change in the reception IP address, or the telephone number of the receiving station. As it is not necessary to travel to the device to modify these data, this clearly provides savings in time and money.

[0037] For example, if there is a failure in the telephone line and we know it will be out of service for several days, it is possible to disable this transmission option to prevent it alerting of this failure constantly.

[0038] Also for example, if one of the alarms console areas has a malfunctioning detector that triggers the alarm constantly, the bi-directional communication will allow disabling said area as long as is deemed convenient.

[0039] The alarms console is provided with several configurable alarm areas, as well as several configurable relay outputs that can be used to activate a mechanism.

[0040] Finally, as regards management of IP addresses, the management software shall be able to operate with IP addresses liable to change, i.e. dynamic IP's, without prior notice from the ADSL service provider. If the IP address changes without prior notice, it will be impossible to transmit any data, so that a control system is required that can detect the changes and update them in the database. In this way the control system, regardless of the number of time that an IP address changes, will always be updated and communications with the device will always be available.

DESCRIPTION OF THE DRAWINGS

[0041] To complete the description made below and in order to aid a better understanding of its characteristics, the present descriptive memory is accompanied by a set of drawings in whose figures, for purposes of illustration and in a non-limiting sense, the most significant details of the invention are shown.

[0042] Figure 1 shows the flow chart of the operation of the data transmission device when it is performing the communications means test function.

[0043] Figure 2 shows the flow chart of the operation of the data transmission device when transmitting data through one of the three communication paths.

[0044] Figure 3 is a schematic representation of an alternative operation of the alarms console object of the invention, where it operates as a data transmission device acting as an interface between a signal generator and data reception devices.

PREFERRED EMBODIMENT OF THE INVENTION

[0045] In view of the figures, a preferred embodiment is described of the invention disclosed.

[0046] Figure 1 shows that when the data transmission device performs a test of the state of its three communication paths, it first performs a TCP/IP test (1) with a programmed interval. If this communication is available (4) the test (1) is transmitted by TCP/IP; otherwise, a TCP/IP failure (5) is transmitted by GSM/GPRS or STN as determined.

[0047] The STN connection test (2) determines whether or not there is connection. If there is no failure the line state is transmitted (6) by STN; otherwise, an STN failure (7) is transmitted by TCP/IP or GSM/GPRS according to the established order.

[0048] The same occurs with the GSM/GPRS communication path test (3); the line state is transmitted (8) by GSM/GPRS in case of a correct connection. If there is no connection a GSM/GPRS failure (9) is transmitted by TCP/IP or STN.

[0049] Figure 2 shows the process involved in the transmission of data by the alarms console acting as a data transmission device. In first place, given data (14), the transmission device performs a state check (15) of the transmission paths, verifying (16) which is the first one with transmission state according to the previously programmed order, either TCP/IP (17), STN (18) or GSM/GPRS (19). It then attempts to establish a connection (20) with the receivers, finding out

(21) whether the connection was successful, in which case it transmits the data (22). Otherwise, it switches to the next communication path in transmission state according to step (15).

[0050] Finally, figure 3 shows schematically the alarms console (25) acting as a data transmission device, the generator device (24) and the communication line (26) between the two devices, as well as the transmission line (27) for both the data detected and the state of the communication paths.

[0051] A bi-directional communication software allows the device object of the invention to communicate in both senses between the device object of the invention and a control station. In addition, management software allows managing dynamic IP's.

[0052] It is not considered necessary to continue this description in order for an expert in the field to understand the scope of the invention and the advantages derived thereof.

[0053] The materials, shape, size and arrangement of the component elements may vary as long as the essence of the invention is not affected.

[0054] The terms used in this memory should be understood in a wide and non-limiting sense.

Claims

1. Alarms console with bi-directional communication through TCP/IP, having a CPU, which by means of a microprocessor controls all processes performed by the alarms console, **characterised in that:**

- It has three communication paths or channels:

- o through a TCP/IP connection;
- o through a switched telephone network, STN;
- o through GSM/GPRS.

- It has bi-directional communication through TCP/IP with a control station from where any console changes or parameters can be controlled

- It has IP address management software allowing operation with dynamic IP's

- It has means for a continuous supervision and monitoring of the means or channels available in the device, wherein said supervision is performed:

- A) From the alarms console to the receiver;
- B) From the receiver to the transmitter.

2. Alarms console with bi-directional communication through TCP/IP, as claimed in claim 1, **characterised in that** to establish communications through the three paths or channels the console is provided with:

- A TCP/IP module in charge of communications through a TCP/IP connection, ADSL or local area network between the device and an Aifos decoder;
- A telephone dialler for autonomous transmission through the STN;
- A GSM/GPRS modem in charge of communications between the transmitter device and the GSM/GPRS receiver through the Data Channel.

3. Alarms console with bi-directional communication through TCP/IP, as claimed in claim 2, **characterised in that** in addition to transmitting the data characteristic of its function, the alarms console also sends in the same format the telephone line failure signal, GSM/GPRS failure signal or communication failure through TCP/IP signal or STN communication failure signal.

4. Alarms console with bi-directional communication through TCP/IP, as claimed in claim 3, **characterised in that** the alarms console supervises the three communication paths by tests performed periodically, where:

- in case of connection failure through TCP/IP connection, the failure is transmitted by STN or GSM/GPRS as determined;
- in case of Switched Telephone Network failure, the failure is transmitted by TCP/IP or GSM/GPRS as determined;
- in case of GSM/GPRS coverage failure, the failure is transmitted through TCP/IP or STN.

5. Alarms console with bi-directional communication through TCP/IP, as claimed in claim 2, **characterised in that** joined to the other end of the alarms console are the TCP/IP, STN or GSM/GPRS receivers, in the case of a TCP/IP receiver being provided with a TCP modem.

5 6. Alarms console with bi-directional communication through TCP/IP, as claimed in any of the preceding claims, **characterised in that** the alarms console operates as a data transmission device, acting as an interface between a signal generator and reception equipment.

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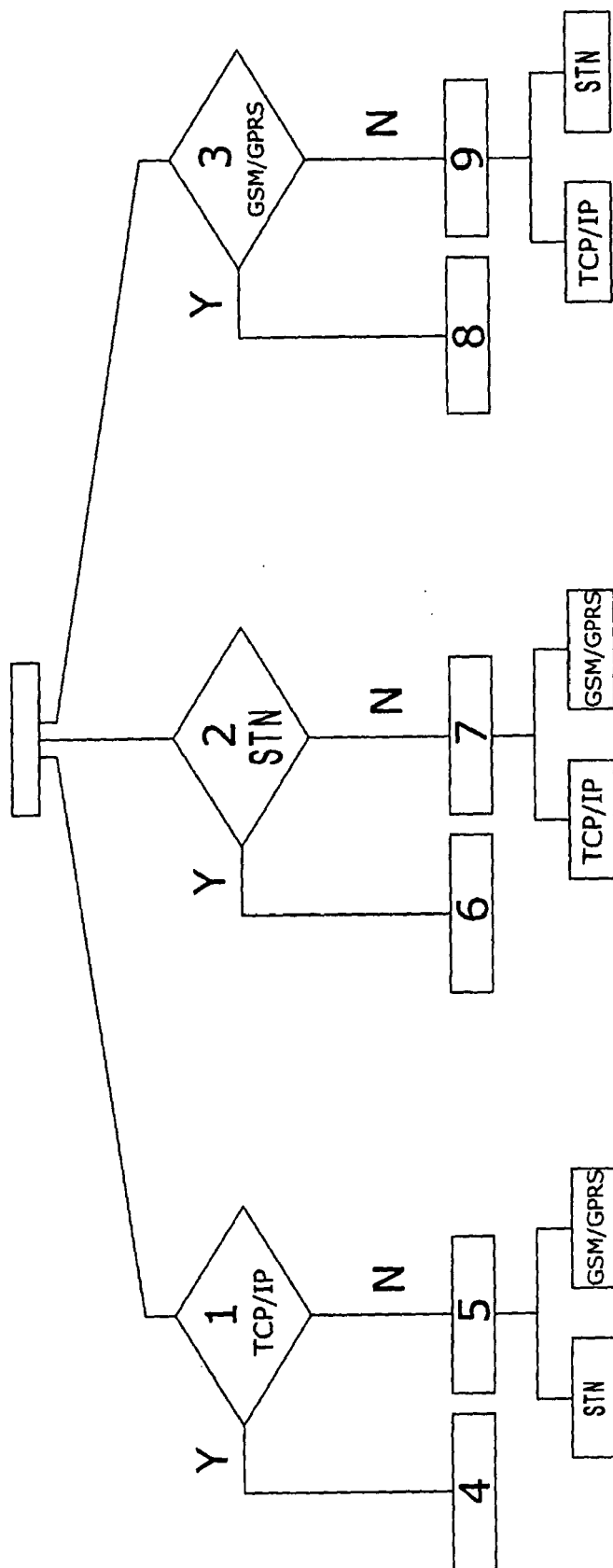


FIG. 1

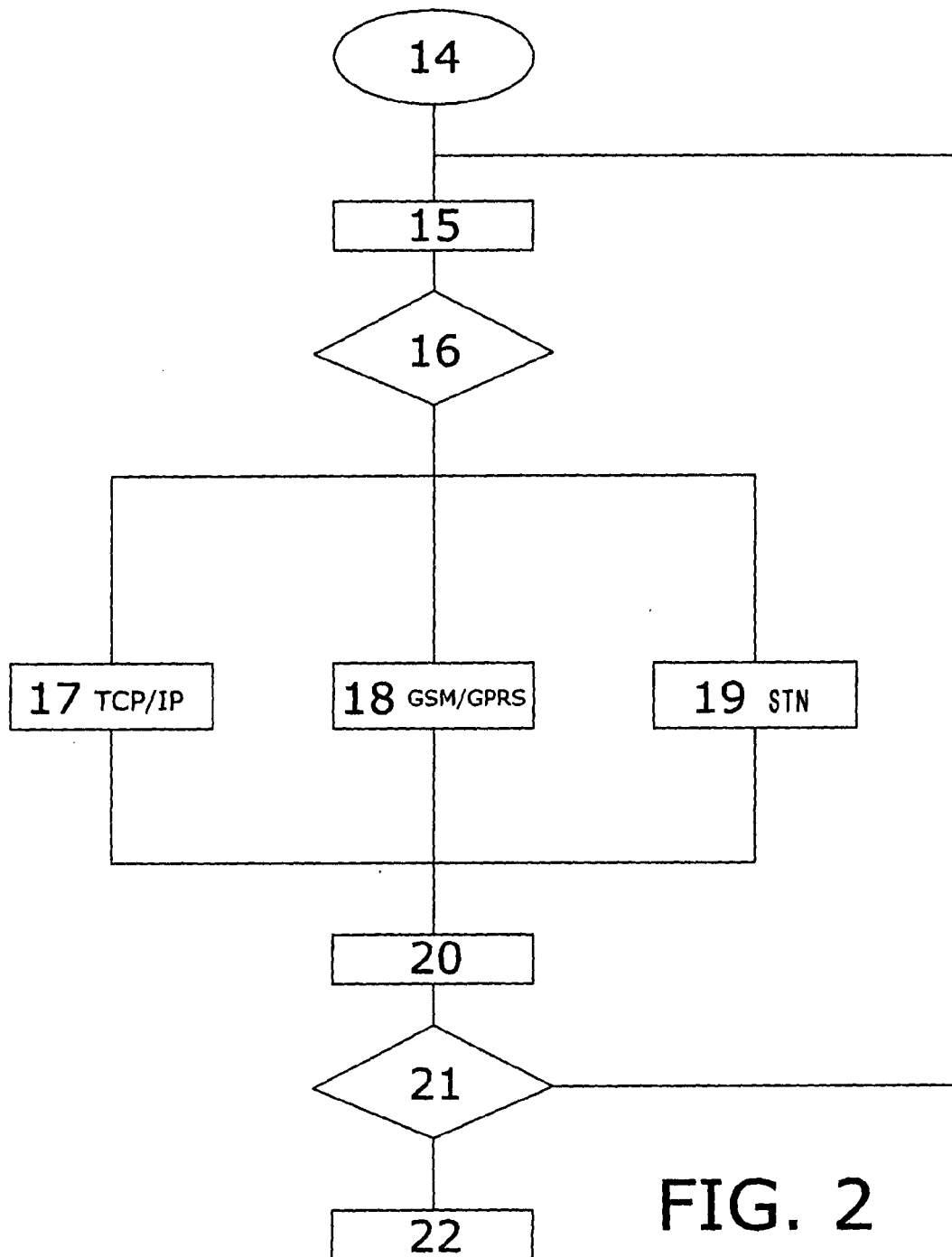


FIG. 2

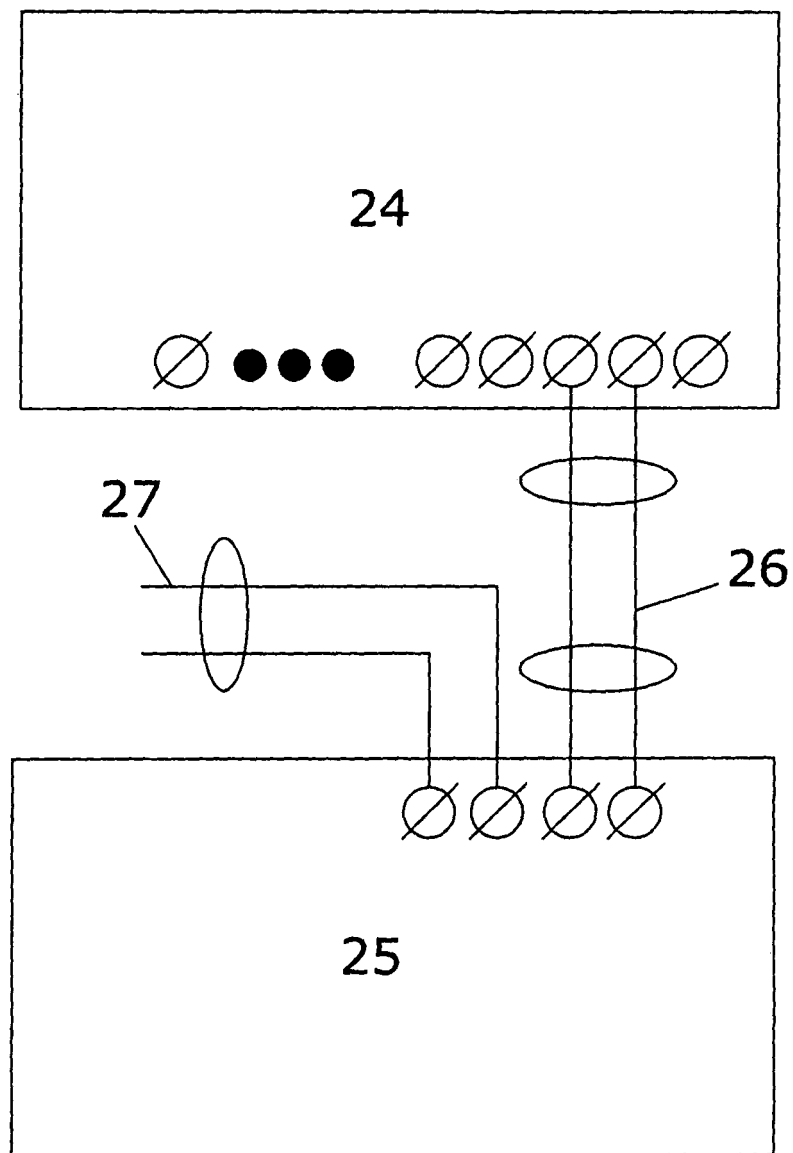


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 38 1007

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 25 July 2005	Examiner De la Cruz Valera, D
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			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 05 38 1007

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