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(54) Fire fighting system mainly conceived to safeguard forests

Feuerbekämpfungssystem geeignet für Waldüberwachung

Système de lutte contre les incendies essentiellement conçu pour la sauvegarde des forêts

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Description

The invention presented regards an integrated system which is particularly well suited for the safeguard of wooded areas against fires.

In particular the invention refers to a fire fighting system, mainly intend for the safeguard of wooded areas, for raising a fire alarm comprising a peripheral detection station including an infrared sensor for detecting a given surveyed area, which infrared sensor measures the radiation flow coming from a small angular region of said area, rotating means supporting the infrared sensor, which confers an azimuth scan to the infrared sensor, a local processor which acquires data from the infrared sensor and manages data exchange with a local control centre, from which it receives commands, a peripheral station communications subsystem provides for transmission of data to the local control centre; and said local control center including a communications subsystem which receives the data sent by said peripheral station communications subsystem and emits said commands for controlling of the local processor, a peripheral memory unit for recording of data, a central processor which controls the peripheral detection station, controls the exchange of commands and data, illustrates the notified alarm on topographic maps of the area, records data on said peripheral memory unit, displays system status and integrates the notified alarm with data of a historical data bank containing information on the distribution of vegetation of the surveyed area.

At present, the problem of fires in wooded areas has reached worrying levels. The forests of Argentario and Sardinia are sad evidence of this.

G. Jacovitti and R. Cusani describe in the article "A REAL TIME IMAGE PROCESSOR FOR AUTOMATIC BRIGHT SPOT DETECTION", Onzième Colloque sur le Traitement du Signal et des Images, Nice du ler au 5 Juin 1987, pages 587-590, techniques of images processing have been applied to infrared TV images to detect and locate vegetation fires. A peripheral station is equipped with some TV infrared cameras. The cameras can rotate over a 180° angle in the azimuthal plane. The peripheral station is connected via a microwave radio link and a bidirectional UHF radio link to a control station, where the whole surveillance operation takes place.

Thus at least two infrared cameras are required as to scan over 360°. Further in the central control station a very powerful main processor is required as to perform the image processing.

In the described system no weather sensors are provided. The processor can not integrates the received alarm with the current and historical weather data. For that reason there is no possibility to calculate a fire propagation model with information about propagation speed and direction of the fire.

But of course the most frequent inconvenience has always been the late arrival of fire fighters due to the fact that there has never been an instantaneous detection of fire and alarm transmission.

The scope of this invention is therefore a system which offers automatic monitoring of fires and which calculates a fire propagation model. The utilisation of infrared sensors and of all the devices which form the system, are noteworthy step ahead in the safeguard of wooded areas, till present trusted to towers and look out personnel.

Therefore, the fire fighting system is characterised in that the local processor of the peripheral detection station further acquires data from means for collecting current weather data included in the peripheral detection station, provides for extraction of fire alarm and causes the transmission of the alarm signal and the weather data to the local control centre via the communications subsystems, and in that the central processor of the local control centre further integrates the alarm extracted by said peripheral detection station with instantaneous weather data and with data of the historical data bank further containing information on recent weather conditions, as to develop a fire propagation model as a function of said integration, whereby the model is based upon the instantaneous weather data, the vegetation distribution, and the recent weather conditions, resulting in a propagation speed and direction of the fire.

The system of the invention so consists of two sub assemblies: the remote detector and the local control centre. More than one detector can be connected to the local control centre, in quantities from 5 to 10. For illustrative non limiting purposes the invention will now be decribed with reference to the tables of drawings attached.

Figure 1 shows the block diagram of the entire system, where the arrows stand for the connections among the units of the system:

1 Peripheral detector (usually each system includes more than one detector); this block is expanded in figure 2;
2 Communications subsystem;
3 Central processor;
4 Observed fire evolution prediction model;
5 Historical data base;
6 TV monitor;
7 Video recorder;
8 Memory unit (hard disk, tape unit);
9 Printer.

Figure 2 is a schematic representation of the peripheral detector, indicated as block 1 in figure 1. Here we can see:

10 Infrared sensor;
11 TV camera;
12 Rotating platform;
13 Local processor;

14 Weather sensor group;
15 Communications subsystem.

More in detail, the remote detector consists of:

An infrared sensor 10 which has a spectral sensitivity such as to provide an optimum detection of hot sources (300-700 degrees C) against an ambient temperature background (0-40 degrees C). As regards operation and structure of such sensor, refer to the invention filed in Italy on December 21, 1989 with number 48685-A/89 (= WO-A-9109389 & EP-A-458925).

A group of weather sensors 14 which provide data on temperature, relative humidity, pressure, wind speed and direction, solar radiation and rain rate.

A TV camera 11 for possible visual monitoring of the surveilled area. A motor driven platform 12 which confers an azimuth scan to the infrared sensor and to the TV camera over 360 degrees. A processor 13 which acquires data from the infrared sensor and provides for extraction of possible alarms, acquires weather sensor data, manages data exchange with the local control centre, from which it receives all commands. The infrared sensor data processing is based upon the following procedure: The infrared sensor measures the radiation flow coming from a small angular region, such as 1 degree x 1 degree; the vertical coverage of the sensor is 15 to 20 degrees and is obtained by means of a linear array of sensitive elements. All data coming from a detector is taken into account: in our case taken as an example, there are 360 datum points, one per azimuth degree covered. The number of data may be less if the area to be monitored is only part of a whole round angle.

The processor calculates the value of the derivative of the signal. This provides for the elimination of the signal long term changing effects, on an angle scale of 10 degrees for instance.

Such variations are typically due to the variation of the angle between the line of sight of the sensor and the position of the sun.

On the contrary, point variations are left unchanged, when less or equal to 1 degree, as these are typical signals of fires developing. The processor then extracts the mean square value of the fluctuations of the signal subject to derivation for each group of data corresponding to a vertical position which we shall call line.

Such value is proportional to the fluctuations of the background on the line itself and, multiplied by a suitable constant value, it is taken as a threshold for the detection of possible signals.

Based upon the threshold determined above, the processor identifies any signal present above such threshold on a line basis. The azimuth angle of the signal is compared with that of signals detected in the previous scans. This is necessary to confer a better reliability to the alarm through a number of consecutive confirmed appearances.

In operation, an alarm is taken as true and therefore transmitted to the local control centre only if it has received a number of confirmations greater than or equal to two in four successive scans.

It is to be noted that this procedure may be completed by the peripheral detection unit in about three minutes, therefore reducing the present detection times of a fire in wooded areas quite considerably.

A communications system 15, such as a radio link remotely controlled by the processor, provides for digital transmission of detected alarms detected by the IR sensor, of weather data and of the TV image to the local control centre.

At the local control centre, the transmitted data is sent to units which perform their processing, registration and integration with data available in cartographic, thematic and historical archives. The local control centre consists of the following:

A TV monitor 6 and a video recorder 7 for the viewing and possible recording of the TV images coming from the remote detection centres.

One or more processors with the following functions:

A: Control of the peripheral stations, exchange of commands and data.

B: Visualization of alarms, notified by the peripheral detection stations, on topographic maps of the area by means of three dimensional projection; calculation of possible intersections between alarms coming from different peripheral stations so as to assure an even more accurate location.

C: Integration of alarms with instantaneous weather data, with data banks containing information on the distribution of vegetation, on recent weather conditions and on human presence in the area.

D: Following integration of data and as a function of it, a fire propagation model is developed; such model is described later on in detail and it is one of the most innovative points of this invention.

E: Recording of data on hard disc or on peripheric units 8 such as tape recorders or optical discs.

F: System status display including possible alarm messages on printer 9.

We shall now describe briefly the procedure adopted for the forecast of the evolution of the observed fire.

The function provided by the program may be performed during operation of the fire fighting system (called in the following on line functions) or separately (off line). The main functions performed by the program are the following:

Digitising of topographic and thematic maps. The data which is available from this digitising are the substrate absolutely necessary for the visualization of alarms on the monitor display of the processor and for the development of the forecast algorithms of the fire development.

Peripheral management: This function preferably used off line transports onto paper the graphics dis-

played on the monitor; this is the documentation required by the fire fighting squads.

Intervisibility management which is performed between any point of the map and one of the peripheral detection stations. This function is used mostly during setting up of the system and it guides in the selection of the best sighting of the peripheral detectors.

Forecast of the fire development. The model is based upon the speed and direction of the wind, on ground gradient and type of fuel, resulting in a propagation speed of the fire as a function of absolute azimuth against north. The algorithm adopted utilises the following parameters:

- Vfo = Intrinsic average speed of propagation of the fire.
- Vfc = Variation of the fire propagation speed depending upon the type and humidity of the burning vegetation. Data on the distribution of vegetation is each time read from the data bank.

The effect of wind is quantified by the following parameters which have an effect on the propagation speed:

- Ci = increment constant due to the greater oxygenation due to wind. It is independent of angle with wind direction, but depends on its intensity.
- Ct = transport constant of the fire front edge, which depends upon the angle between the propagation line and wind direction.

The program provides a graphic output overlayed on the digitised topographic map showing the successive positions of the fire front edge at pre established time intervals.

Now we shall proceed with the detailed description of system operation, with illustrative non limiting purposes, making reference to the two figures mentioned above.

At the peripheral detection site (Figure 2), the data which is detected by the infrared sensor 10 are acquired and processed by local processor 13. One of the tasks of the processor is also the management of rotating platform 12 onto which the IR sensor and the TV camera 11 are fitted. Following interrogation of weather station 14, the processor transmits the position of any possible fire together with weather data by means of the communications system 15. The TV camera transmits images directly to the local control centre by means of the communications system.

The data coming from the peripheric detection station 1 is sorted by the communications subsystem 2. The TV video is visualized on monitor 6 and can also be recorded 7. The infrared sensor data regarding the position of any alarm is fed to processor 3 which places them on the topographic maps. The modelling program 4 develops a forecast of the fire evolution in the hours following detections, relying upon historic, weather, vegetation and other data contained in data bank 5. The weather data acquired in the last scan are inserted in the data bank.

All alarms are processed on the system monitor, on printer 9 and possibly recorded on mass memory 8.

Claims

1. Fire fighting system, mainly intend for the safeguard of wooded areas, for raising a fire alarm comprising a peripheral detection station (1) including:

   - an infrared sensor (10) for detecting a given surveyed area, which infrared sensor measures the radiation flow coming from a small angular region of said area,
   - rotating means (12) supporting the infrared sensor (10), which confers an azimuth scan to the infrared sensor,
   - a local processor (13) which acquires data from the infrared sensor (10) and manages data exchange with a local control centre, from which it receives commands,
   - a peripheral station communications subsystem (15) provides for transmission of data to the local control centre;

   and said local control center including:

   - a communications subsystem (2) which receives the data sent by said peripheral station communications subsystem (15) and emits said commands for controlling of the local processor (13),
   - a peripheral memory unit (8) for recording of data,
   - a central processor (3) which controls the peripheral detection station (1), controls the exchange of commands and data, illustrates the notified alarm on topographic maps of the area, records data on said peripheral memory unit (8), displays system status and integrates the notified alarm with data of a historical data bank (5) containing information on the distribution of vegetation of the surveyed area;

   characterised in that the local processor (13) of the peripheral detection station further acquires data from means for collecting current weather data (14) included in the peripheral detection station (1), provides for extraction of fire alarm and causes the transmission of the alarm signal and the weather data to the local control centre via the communications subsystems (15, 2), and in that the central processor (3) of the local control centre further integrates the alarm extracted by said peripheral de-

tection station (1) with instantaneous weather data and with data of the historical data bank (5) further containing information on recent weather conditions, as to develop a fire propagation model as a function of said integration, whereby the model is based upon the instantaneous weather data, the vegetation distribution, and the recent weather conditions, resulting in a propagation speed and direction of the fire.

2. Fire fighting system as claimed in claim 1, characterised in that the means for collecting current weather data comprises a group of weather sensors (14) which provide for data on temperature, relative humidity, pressure, wind speed and direction, solar radiation and rain rate.

3. Fire fighting system as claimed in claim 1 or 2, characterised in that the historical data bank (5) further contains information on the ground gradient and on human presence in the surveyed area, which information are used for the calculation of the fire propagation model and for the display of area to be protect particularly respectively.

4. Fire fighting system as claimed in any of claims 1 to 3, characterised in that the peripheral detection station (1) further comprises a TV camera (11) for possible visual monitoring of said surveyed area, fitted onto the rotating means (12), and in that the local control center further comprises a TV monitor (6) for viewing of the TV images taken from the TV camera (11) of the peripheral detection station (1) and transferred with the aid of said communication subsystems (15, 2), and a video recorder (7) for possible recording of the TV images.

5. Fire fighting system as claimed in any of claims 1 to 4, characterised in that the local control centre further comprises a printer (9) on which alarm messages generated by the central processor (3) are printed.

6. Fire fighting system as claimed in any of claims 1 to 5, characterised in that the infrared sensor (10) has a spectral sensitivity such as to provide an optimum detection of hot sources within 300-700°C against an ambient temperature background within 0-40°C.

7. Fire fighting system as claimed in any of claims 1 to 6, characterised in that the rotating means is a rotating platform (12) managed by the local processor (13) of the peripheral detection station (1), which confers an azimuth scan to the infrared sensor (10) and the TV camera (11), in case it is available, over 360 degrees.

8. Fire fighting system as claimed in any of claims 1 to 7, characterised in that the signal emitted by the infrared sensor (10) reaches the local processor (13), which calculates the value of the derivative of said signal and extracts the mean square value of the fluctuations of the signal subject to derivation for each group of data corresponding to a vertical position, multiplies such mean square value with a constant value and supplies a threshold value for the detection of possible alarm signal.

9. Fire fighting system as claimed in any of claims 1 to 8, characterised in that the local control centre controls a plurality of peripheral detection stations (1).

10. Fire fighting system as claimed in claim 9, characterised in that the central processor (3) receives the alarms coming from different peripheral detection stations (1) and calculates possible intersections between said alarms so as to assure an even more accurate location of the fire.

Patentansprüche

1. Brandbekämpfungssystem, insbesondere für den Schutz von Waldgebieten durch Abgabe eines Feueralarms, mit einer peripheren Erfassungsstation (1), umfassend

   - einen Infrarotsender (10) zur Erfassung einer vorbestimmten, überwachten Fläche, der den Strahlungsfluß mißt, welcher von einem kleinen Winkelsektor der Fläche kommt,
   - Rotationsorgane (12), die den Infrarotsender (10) tragen und diesem eine Azimutabtastung ermöglichen,
   - eine lokale Recheneinheit (13), die von dem Infrarotsensor (10) Daten aufnimmt und Daten mit einem lokalen Steuerzentrum austauscht, von dem sie Befehle empfängt,
   - ein Kommunikations - Subsystem (15) in einer peripheren Station zur Datenübertragung auf das lokale Steuerzentrum, wobei das lokale Steuerzentrum aufweist:
   - ein Kommunikations - Subsystem (2), das die von den in den peripheren Stationen (15) untergebrachten Kommunikations - Subsystemen abgegebenen Daten empfängt und Befehle zur Steuerung der lokalen Recheneinheit (13) abgibt,
   - einen peripheren Speicher (8) zur Aufnahme von Daten,
   - eine zentrale Recheneinheit (3), welche die periphere Erfassungstation (1) sowie den Austausch von Befehlen und Daten steuert, den gemeldeten Alarm auf einer topographischen

Karte des Gebietes sichtbar macht, Daten in dem peripheren Speicher (8) speichert, den Systemstatuts anzeigt und den gemeldeten Alarm mit den Daten einer historischen Datenbank (5) integriert, welche Informationen über die Vegetationsverteilung der überwachten Fläche enthält,

dadurch gekennzeichnet,

daß die lokale Recheneinheit (13) der peripheren Erfassungstation (1) außerdem Daten erhält von einer Einrichtung (14) zum Sammeln von Daten über das jeweilige Wetter, die in der peripheren Erfassungsstation (1) untergebracht ist, den Feueralarm auslöst und das Alarmsignal sowie die Wetterdaten über das Kommunikations - Subsystem (15, 2) an das lokale Steuerzentrum weiterleitet,
und daß die zentrale Recheneinheit (3) des lokalen Steuerzentrums außerdem den durch die periphere Erfassungsstation (1) ausgelösten Alarm mit den augenblicklichen Wetterdaten und Daten der historischen Datenbank (5) integriert, die Informationen über letzte Wetterbedingungen enthält, wodurch in Funktion dieser Integration ein Feuerausbreitungsmodell erzeugt wird, das auf den augenblicklichen Wetterdaten, der Vegetationsverteilung und den letzten Wetterbedingungen beruht, woraus sich die Ausbreitungsgeschwindigkeit und die Richtung des Feuers ergibt.

2. Brandbekämpfungssytem nach Anspruch 1, dadurch gekennzeichnet, daß die Einrichtung (14) zum Sammeln von Daten über das jeweilige Wetter eine Gruppe von Wettersensoren (14) hat, die Daten über die Temperatur, die relative Luftfeuchtigkeit, den Druck, die Windgeschwindigkeit und Windrichtung, die Sonneneinstrahlung und die Regenrate bereitstellt.

3. Brandbekämpfunssystem nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die historische Datenbank (5) Informationen über den Bodenverlauf und den Aufenthalt von Menschen in dem überwachten Gebiet enthält, welche zur Berechnung des Feuerausbreitungsmodells und zur Anzeige der besonders zu schützenden Fläche verwendet werden.

4. Brandbekämpfungssystem nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die periphere Erfassungsstation (1) ferner eine Fernsehkamera (11) zur möglichen visuellen Aufnahme des überwachten Gebietes hat, die auf den Rotationsorganen (12) angebracht ist, und daß das lokale Steuerzentrum einen Fernsehmonitor (6) zur Wiedergabe der Bilder, die von der Fernsehkamera (11) der peripheren Erfassungsstation (1) aufgenommen und über das Kommunikations-Subsystem (15, 2) übertragen worden sind, sowie einen Videorecorder (7) zur Aufnahme der Bilder aufweist.

5. Brandbekämpfungssystem nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das lokale Steuerzentrum einen Drucker (9) aufweist, auf welchem die von der zentralen Recheneinheit (3) erzeugten Alarmsignale ausgedruckt werden.

6. Brandbekämpfungssystem nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Infrarotsensor (10) eine solche Empfindlichkeit hat, daß eine optimale Feststellung heißer Quellen im Bereich zwischen 300 und 700°C gegen eine Umgebungstemperatur zwischen 0 und 40°C erfolgt.

7. Brandbekämpfungssystem nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Rotationsorgane aus einer rotierenden Plattform (12) bestehen, welche von der lokalen Recheneinheit (13) der peripheren Erfassungsstation (1) gesteuert wird und eine Azimutabtastung über 360° an den Infrarotsensor (10) und gegebenenfalls die Fernsehkamera (11) weiterleitet.

8. Brandbekämpfungssystem nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das von dem Infrarotsensor (10) abgegebene Signal die lokale Recheneinheit (13) erreicht, welche die Größe der Ableitung des Signals errechnet und den mittleren Quadratwert der Schwankungsbreite des Signals extrahiert, das für jede einer vertikalen Position entsprechenden Datengruppe einer Ableitung unterworfen ist, diesen mittleren Quadratwert mit einer Konstante multipliziert und den Schwellenwert für die Erfassung eines möglichen Alarmsignals liefert.

9. Brandbekämpfungssystem nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das lokale Steuerzentrum eine Vielzahl peripherer Erfassungsstationen (1) steuert.

10. Brandbekämpfungssystem nach Anspruch 9, dadurch gekennzeichnet, daß die zentrale Recheneinheit (3) die Alarmsignale aufnimmt, die von den verschiedenen peripheren Erfassungsstationen (1) kommen, und mögliche Überschneidungen zwischen diesen Alarmsignalen errechnet, um eine nochmals genauere Lokalisierung des Feuers sicherzustellen.

Revendications

1. Système de lutte contre les incendies, essentiellement destiné à la sauvegarde des régions boisées, pour émettre une alarme d'incendie, comprenant une station de détection périphérique (1) incluant:

   - un capteur infrarouge (10) pour détecter une région surveillée donnée, lequel capteur infrarouge mesure le flux de radiation provenant d'une faible zone angulaire de ladite région,
   - un moyen de rotation (12) supportant le capteur infrarouge (10), qui confère au capteur infrarouge un balayage en azimut,
   - un processeur local (13) qui fait l'acquisition de données provenant du capteur infrarouge (10) et gère l'échange des données avec un centre de commande local, à partir duquel il reçoit des commandes,
   - un sous-système (15) de communications de station périphérique assure la transmission de données vers le centre de commande local

   et ledit centre de commande local incluant :

   - un sous-système (2) de communications qui reçoit les données envoyées par ledit sous-système (15) de communications de station périphérique et émet lesdites commandes pour commander le processeur local (13),
   - une unité de mémoire périphérique (8) pour enregistrer les données,
   - un processeur central (3) qui commande la station de détection périphérique (1), commande l'échange des commandes et des données, illustre l'alarme notifiée sur des cartes topographiques de la région, enregistre les données dans ladite unité de mémoire périphérique (8), affiche l'état du système et intègre l'alarme notifiée avec les données d'une banque de données historiques (5) contenant les informations sur la distribution de végétation de la région surveillée ;

   caractérisé en ce que le processeur local (13) de la station de détection périphérique fait en outre l'acquisition de données à partir de moyens pour collecter les données météorologiques courantes (14) incluses dans la station de détection périphérique (1), assure l'extraction de l'alarme d'incendie et provoque la transmission du signal d'alarme et des données météorologiques vers le centre de commande local par l'intermédiaire de sous-systèmes de communications (15, 2), et en ce que le processeur central (3) du centre de commande local assure en outre l'intégration de l'alarme extraite par ladite station de détection périphérique (1) avec les données météorologiques instantanées et avec les données de la banque de données historiques (5) contenant en outre l'information sur les conditions météorologiques récentes, de façon à développer un modèle de propagation d'incendie en fonction de ladite intégration, de sorte que le modèle est basé sur les données météorologiques instantanées, la distribution de végétation, et les conditions météorologiques récentes, résultant en une vitesse et une direction de propagation de l'incendie.

2. Système de lutte contre les incendies selon la revendication 1, caractérisé en ce que le moyen pour collecter les données météorologiques courantes comprend un groupe de capteurs météorologiques (14) qui fournit les données de température, d'humidité relative, de pression, de vitesse et de direction du vent, de radiation solaire et de taux de précipitation.

3. système de lutte contre les incendies selon les revendications 1 ou 2, caractérisé en ce que la banque de données historiques (5) contient en outre des informations sur le gradient de sol et sur la présence humaine dans la région surveillée, lesquelles informations sont utilisées respectivement pour calculer le modèle de propagation d'incendie et pour désigner les zones qu'il faut protéger en particulier.

4. Système de lutte contre les incendies selon l'une quelconque des revendications 1 à 3, caractérisé en ce que la station de détection périphérique (1) comprend en outre une caméra TV (11) pour surveiller si possible visuellement ladite région surveillée, adaptée sur le moyen de rotation (12), et en ce que le centre de commande local comprend en outre un écran de télévision (6) pour visualiser les images TV prises par la caméra TV (11) de la station de détection périphérique (1) et transférées à l'aide desdits sous-systèmes de communications (15, 2), et un enregistreur video (7) pour enregistrer si possible les images TV.

5. Système de lutte contre les incendies selon l'une quelconque des revendications 1 à 4, caractérisé en ce que le centre de commande local comprend en outre une imprimante (9) sur laquelle sont imprimés des messages d'alarme générés par le processeur central (3).

6. Système de lutte contre les incendies selon l'une quelconque des revendications 1 à 5, caractérisé en ce que le capteur infrarouge (10) a une sensibilité spectrale adaptée pour produire une détection optimale des sources chaudes allant de 300°C à 700°C par rapport à un environnement de température ambiante allant de 0°C à 40°C.

7. Système de lutte contre les incendies selon l'une

quelconque des revendications 1 à 6, caractérisé en ce que le moyen de rotation est une plateforme rotative (12) pilotée par le processeur local (13) de la station de détection périphérique (1), qui confère un balayage en azimut au capteur infrarouge (10) et à la caméra TV (11), dans le cas où celle-ci est disponible, sur 360 degrés.

8. Système de lutte contre les incendies selon l'une quelconque des revendications 1 à 7, caractérisé en ce que le signal émis par le capteur infrarouge (10) atteint le processeur local (13), qui calcule la valeur de la dérivée dudit signal et extrait la valeur quadratique moyenne des fluctuations du signal sujet à dérive pour chaque groupe de données correspondant à une position verticale, multiplie ladite valeur quadratique moyenne avec une valeur constante et fournit une valeur de seuil pour la détection du signal d'alarme éventuel.

9. Système de lutte contre les incendies selon l'une quelconque des revendications 1 à 8, caractérisé en ce que le centre de commande local commande une pluralité de stations de détection périphériques (1).

10. Système de lutte contre les incendies selon la revendication 9, caractérisé en ce que le processeur central (3) reçoit les alarmes provenant de différentes stations de détection périphériques (1) et calcule des intersections éventuelles entre lesdites alarmes de façon à assurer une localisation encore plus précise de l'incendie.

Fig. 1

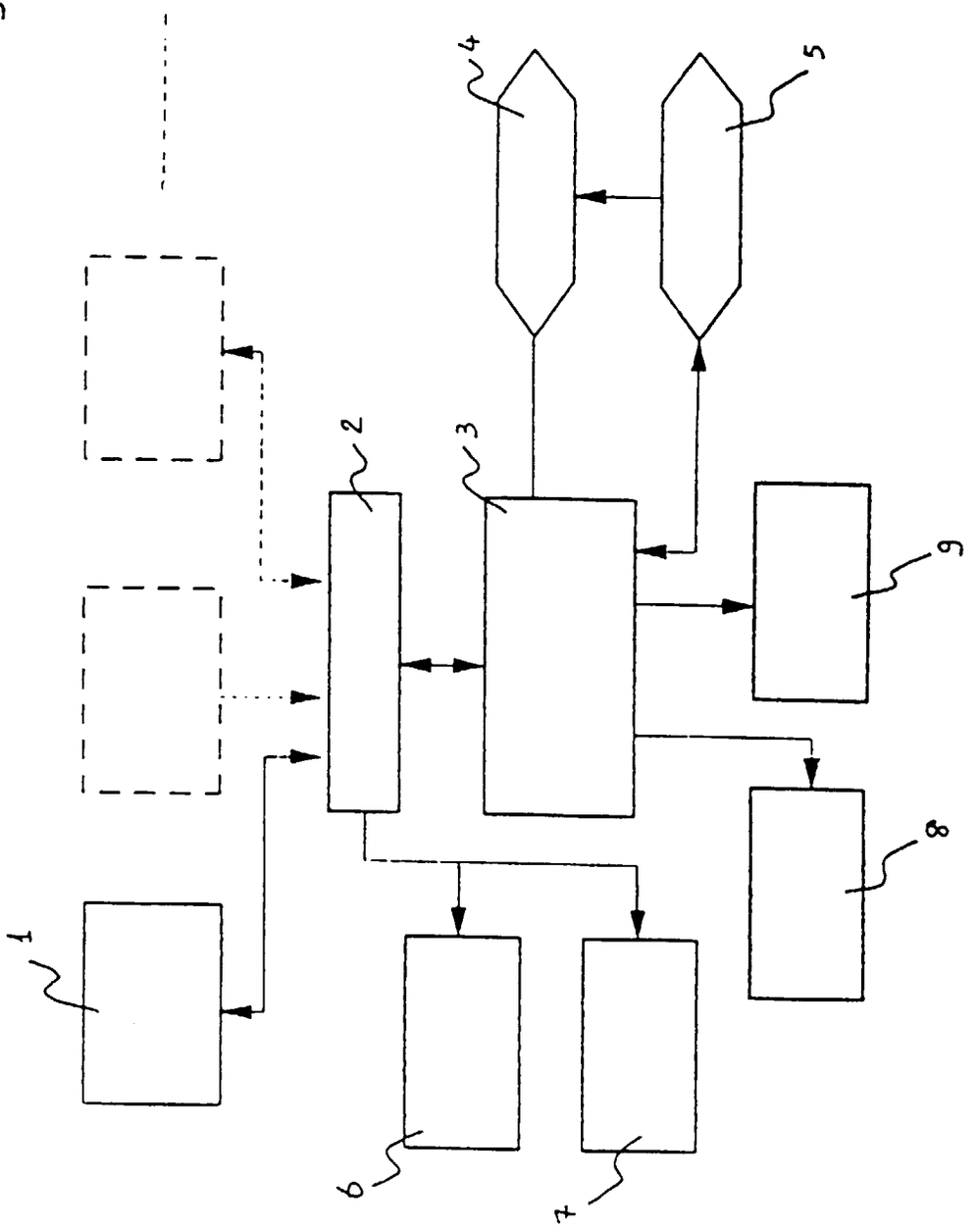

Fig. 2