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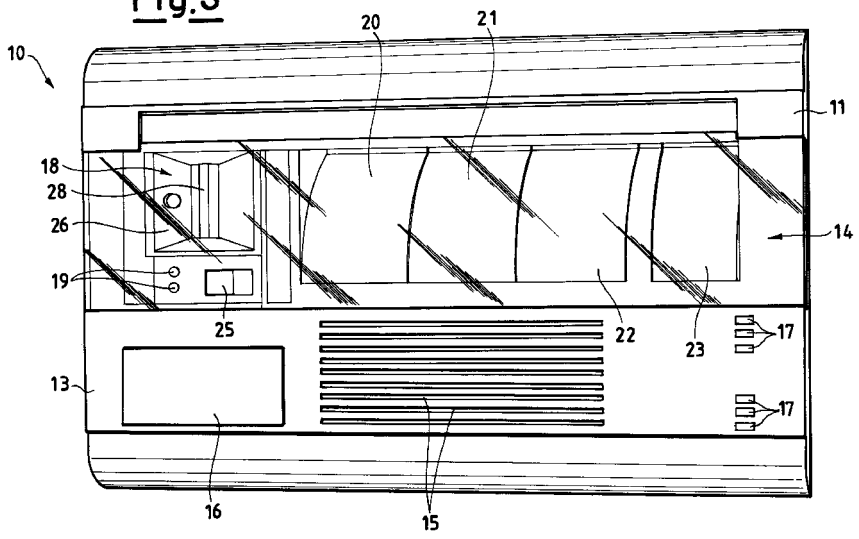
(54) Automatic detection and signalling system of dangerous or emergency situations

(57) An automatic detection and signalling system of dangerous or emergency situations, including a base control unit (10), installed on the premises of the caller which, by pressing a push button (20, 21, 22) or due to the intervention of certain exterior anti-intrusion (48, 78, 79) and ambient (75-77) sensors and detectors, sends an intervention request through a sequence switch to a series of telephone numbers, programmed by the user, and memorized in the system or to an operations centre which identifies the receiver of the request and coordinates the assistance by simultaneous viva voce communication with the caller and phone communication with the helpers.

Fig.3



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Description

[0001] The present invention refers to an automatic detection and signalling system of dangerous or emergency situations.

[0002] Currently there are teleassistance electronic devices particularly of use in aiding persons in need of help, which are able to send a request for help through a telephone dialer which dials a series of telephone numbers in order, programmable by the user, after pressing a certain push button of a portable radio remote control.

[0003] Subsequently, in the case of anti-theft electronic devices, a similar system is used in which the alarm device is connected to the nearest police station.

[0004] Based on this, however, the need is felt to integrate, in a single structure made available to the user, an automatic detection and signalling system of dangerous or emergency situations which could potentially occur at home or in the workplace.

[0005] The aim of the present invention is therefore to demonstrate an automatic detection and signalling system of dangerous or emergency situations that, in the event of serious and immediate danger, allows the timely sending of a request for help to the competent public services.

[0006] Another aim of the present invention is to demonstrate an automatic detection and signalling system of dangerous or emergency situations which allows, under certain conditions, the timely signalling of an alarm, identifying in any case the place where the alarm sounded.

[0007] A further aim of the present invention is to produce an automatic detection and signalling system of dangerous or emergency situations which is easy and cheap to produce, without using complex or expensive technologies, using simple circuit solutions and known electronic components.

[0008] These and other aims are achieved by an automatic detection and signalling system of dangerous or emergency situations, according to claim 1, to which reference is made for the sake of brevity.

[0009] Advantageously, the system, which is the object of the present invention, includes a control unit with a telephone dialer and a set of peripheral detectors (anti-intrusion detectors, fire detectors, methane gas detectors, carbon monoxide detectors and flood detectors).

[0010] The control unit subsequently includes an extractable emergency lamp to supply light in the event of a blackout.

[0011] The system can be produced in a wall-mounted or external version (wall or table-top) and, upon activation by a user pressing a push button, the system automatically sends, through a telephone network, an alarm voice announcement to an operations centre which puts the requests for assistance through to the personnel in charge, depending on the type of alarm sent.

[0012] In any case, the control unit is connected to the normal telephone network for communicating with a call-centre and to the 230 Volt electric network for the power supply and charging of the battery relating to the emergency lamp; alternatively the control unit may be completely battery powered in the wall and table-top versions.

[0013] Finally, various radio controls are envisaged, some optional, among which a radio remote control to set the control unit in a surveillance status and bring it back to rest status, acoustic alarm signallers, a viva voce device and a radio receiver to pick up signals coming from the detectors.

[0014] Additional aims and advantages of the present invention will become clear from the description which follows and from the designs enclosed, provided purely as an explanatory and non-limiting example, in which:

- figure 1 represents a front view of a first embodiment of a control unit used in an automatic detection and signalling system of dangerous or emergency situations, according to the present invention;
- figure 2 represents a front view of a second embodiment of a control unit used in an automatic detection and signalling system of dangerous or emergency situations, according to the present invention;
- figure 3 represents a front view of a third embodiment of a control unit used in an automatic detection and signalling system of dangerous or emergency situations, according to the present invention;
- figure 4 is an exploded view of the base control unit used in figures 3, according to the present invention;
- figure 5 represents a perspective view of a fourth embodiment of a control unit used in an automatic detection and signalling system of dangerous or emergency situations, according to the present invention;
- figure 6 represents a perspective view of a fifth embodiment of a control unit used in an automatic detection and signalling system of dangerous or emergency situations, according to the present invention;
- figure 7 represents a perspective view of a first embodiment of a detector device which is used in an automatic detection and signalling system of dangerous or emergency situations, according to the present invention;
- figure 8 is a perspective view from the rear of the device used as in figure 7;
- figure 9 is a plan view of the detector device of figure 7;
- figure 10 is a perspective view of a second embod-

iment of a detector device which is used in an automatic detection and signalling system, according to the present invention;

- figure 11 is a perspective view of a third detector device example used in an automatic detection and signalling system, according to the present invention;
- figure 12 represents a functional block diagram of the detection and signalling system of dangerous or emergency situations, according to the present invention.

[0015] With reference to the figures mentioned, 10 generically indicates a control unit of the automatic detection and signalling system of dangerous or emergency situations, which is subject of the present invention.

[0016] In practice, the detection and signalling system of dangerous or emergency situations, according to the present invention, is an electronic device which manages, in domestic situations, the functions of teleassistance, anti-intrusion and ambient alarms (gas, fire and flood detection).

[0017] The control unit 10 incorporates, in a single object, the alarm signalling devices such as a siren, and the communication devices for the remote signalling of the alarm, as a telephone dialer with a viva voce system.

[0018] The system is available in a wall-mounted version as shown in figures 1, 2 and 3 or a wired wall or table-top version (respectively represented by figures 5 and 6).

[0019] In particular, figure 1 shows a control unit 10 of the wall-mounted version, the frame 11 of which includes a front plate 13, which is modularly compatible with a cover 12. The cover 12 is provided in order to protect additional electrical equipment, namely meters, switches or circuit breaker; alternatively, the frame 11 can be shaped so as to exclusively include the electronic equipments and the function keys of the detection system as shown in figures 2-4.

[0020] The control unit 10 is powered by the conventional 230 Volt electric network, in the wall-mounted version, or battery powered in the case of the wall and table-top versions, and is connected to a normal telephone line by a built-in automatic sequence switch for conventional telephone lines.

[0021] The telephone dialer allows the automatic connection to an operations centre or the sending of voice calls (pre-recorded vocal alarm messages) directly to programmed telephone numbers.

[0022] With particular reference to figures 1-4, it is noted that the front plate 13 of control unit 10 has a shaped cover 14, which can be lifted upwards, giving access to a series of push buttons 20, 21, 22, 23, each complete with symbols and/or reference captions for the separate activation of different alarm types.

[0023] In particular, in illustrative but non-limiting embodiments, the push buttons 20-22 start the automatic call to an operations centre through which is carried out, respectively, a request for health assistance (symbol: red cross), an emergency request made to the police following threats, acts of aggression or theft (symbol: SOS) and a request for urgent household maintenance, such as the services of a plumber, electrician or builder for urgent repairs (symbol: spanner).

[0024] On the other hand, the push button 23 can annul calls made by mistake.

[0025] In addition, a grille 15 covers a viva voce device and an acoustic signaller while a container 16, which may be extracted from the front plate 13, has a slot 30 in which to put one or more remote controls 72, 82 which activate, via radio, all the functions permitted by the push button controls of unit 10. In particular, the remote control 82 alone commands the placing of the central unit in a surveillance status and rest status; the radio remote control 72 allows, in addition, the remote activation of teleassistance and the activation and deactivation of the anti-intrusion system with the possibility of radio connection with one or more anti-intrusion detectors (passive infrared and perimetric, for doors and windows) and ambient ones (gas, smoke and flood detectors) with the actuators of the system and with an exterior siren.

[0026] The control unit 10 manages, as a whole, a maximum number of 15 detectors, 2 exterior sirens and 2 alarm actuators, while an alarm siren and an acoustic signaller for user signalling are directly built into the unit.

[0027] Finally, the front plate 13 has a series of eight coloured LEDs, generically denoted by 17, providing visible signalling of the control unit 10 status, an alarm in progress and/or any operation defects or faults of the entire system, while the rear of the frame 11 contains the system electronic circuit boards 34 secured to a shaped container 36, in turn inserted inside the proper built-in box 38; in particular a voice synthesis device is included for maintenance and diagnostics signalling, a viva voce device for speaking over the telephone line, with the operations centre operator or the individual called, during the teleassistance calls, a microphone to allow ambient listening during the anti-intrusion alarm, and an anti-opening and tamper-proof protection device.

[0028] In the wall-mounted version of the system, next to the signalling push buttons 20-23 of the various alarm conditions and underneath the protection cover 14, is an extractable and rechargeable autonomous emergency lamp, used as a portable light torch, after removal from the control unit 10, in the event of a blackout; the torch is generically denoted by 18 in the figures 1, 3, 4. Under normal operating conditions, there may be the switching on of a soft light inside the torch 18, while the 230 Volt electric network powers a built-in torch 18 battery, whose energy, once stored, is used to power a filament lamp or fluorescent tube 28 of the same portable torch, which can be, in such manner,

switched on by switch 25 next to the screen 26 and therefore used to light the surroundings in the event of a blackout within the environment where the control unit 10 is installed.

[0029] At the same time, the 230 Volt electric network powers a series of NiMH rechargeable batteries built-in to the control unit, connected to the electronic circuit 34, giving the control unit 10 over 1 month's autonomy in the absence of the 230 Volt power supply.

[0030] With regard to this, the LEDs, denoted by 19 in figures 1 and 3, may signal torch 18 operation in the presence and absence of the power supply.

[0031] With reference to figures 5 and 6, which represent two exterior versions of the system, respectively, table-top and wall, of control unit 10, the parts having the same function of those already represented in figures 1-4 are denoted by the same reference numbers; the base control unit 10 is always connected to the telephone line, while its functioning, without any mains connection, is guaranteed by a series of non-rechargeable lithium batteries, for at least 4 years' autonomy under normal conditions of use.

[0032] Lastly, the unit 10 of the exterior versions of the system, according to the present invention, has an antenna 40 for radio communication with the detectors.

[0033] In actual fact, full system operation is achieved due to the installation of appropriate remote controls and detectors, namely the passive infrared anti-intrusion detectors shown in detail in figures 7-9 and denoted by 48.

[0034] It concerns a moveable wall mounted device, not built-in, (as clearly shown by the dotted lines in figure 9) secured by means of a joint 47, on the back 41 of the device, connected to a fixing bracket 43 to wall 45, and including a passive infrared sensor with Fresnel lens 42 optimised for the volumetric coverage of a room in a building; the detector 48, if positioned high up on a side wall (approx. 2-2.5 metres off the floor, preferably in a corner), provides optimum coverage of a room in a building and communicates via radio with the control unit 10, immediately generating and transmitting an alarm in the event of the presence of a person moving in the area monitored by the sensors.

[0035] Furthermore, it includes a non-rechargeable lithium battery for a minimum operating life of 4 years without replacement, a signalling LED 44 (usually red) for the verification of the volumetric coverage during the installation stage, an anti-opening and tamper-proof protection device and a push button 46 for the operation and installation test of the device. The anti-intrusion detector 48 is also equipped with a self-diagnosis circuit of rechargeable battery status, which is signalled by radio transmission to the control unit 10. In addition, the detector 48 transmits periodic monitoring data to the control unit 10.

[0036] Subsequently, anti-intrusion detectors for doors and windows may be envisaged, of magnetic contact position type, for the perimetric protection of closed doors and windows.

[0037] An example of such detectors is shown in figure 10; it comprises of two components 50, 51, which must be assembled so that they come together when the door or window is closed.

[0038] The two components 50, 51, move apart upon opening the door (or window) sounding an alarm which the transmitting part immediately sends to the control unit 10; the detector is also equipped with an input alarm which may be connected to any type of exterior sensor by means of a suitable internal terminal board.

[0039] Such detectors include, identical to the passive infrared ones, a radio transmitter for communication with control unit 10, a non-rechargeable lithium battery for a minimum operating life of 4 years without replacement, a signalling LED 52 (usually red) for the verification of its correct positioning during installation, with periodic transmission of its battery status and diagnosis to control unit 10, an anti-intrusion and tamper-proof protection device, a push button 53 for the detector test and installation.

[0040] Moreover, a flange is installed for fixing a permanent magnet to the framework of the doors or windows to be monitored, to be matched up with the detector.

[0041] Another type of anti-intrusion detector which can be installed comprises of a detector for open doors and windows, typically for summer use; it concerns an operative device designed for the perimetric protection of living space near doors or windows, which is positioned directly outside the framework of the door or window to be protected.

[0042] In such case, the device creates an invisible barrier, which, if crossed by a person, sets off an alarm signal and immediate transmission to the control unit 10; the device is designed so that air flows do not cause false alarms, and is thus suitable for the protection of doors and windows during the summer period, when, especially at night, rooms are left open to allow natural ventilation.

[0043] A series of ambient detectors can be connected to the control unit 10, namely a gas and carbon monoxide detector with a built-in emergency lamp, a smoke detector and a flood detector (the latter is shown in figure 11).

[0044] The gas detector is equipped with a dual sensor able to detect both the presence of methane gas (or other explosive gas) and carbon monoxide (or other toxic gas); it has a radio-transmitter to the control unit 10, a periodic transmitter to the same control unit 10 of detector status, a gas sensor operating only in the presence of a 230 Volt power supply, a direct control, in the event of alarm, with relay output and the availability of deflection contact (NC and NA), of an electro-valve or another electrical load, a linear emergency lamp with a 6W tube and 1 hour's autonomy in the absence of network power and a built-in acoustic alarm signal.

[0045] The smoke detector is a device for ceiling mounting, not built-in, in compliance with current installation legislation; the device detects the presence of smoke based on the light diffusion principle (Tyndall effect). In the continued presence of smoke exceeding a certain intensity the detector sets off an alarm which is transmitted via radio to control unit 10.

[0046] It includes a light reflection smoke sensor, a radio-transmitter for communicating with the control unit 10, a non-rechargeable lithium battery for a minimum operating life of 4 years, a push button for the testing and installation of the device, a periodic transmitter which sends to the control unit 10 a series of signals relating to the detector status with battery operation diagnosis and a built-in acoustic alarm signaller.

[0047] The flood detector is a device for wall mounting, with the lower end 60 resting on the floor 61, as clearly visible from figure 11; the device includes a suitable sensor which, at the lower end 60, detects the presence of a film of water on the floor 61 of at least 3-4 mm in height.

[0048] Fixture to wall 62 is achieved with a bracket 63, fixed with screws and dowels or with double sided adhesive tape, so that the detector casing 64 may be easily removed from time to time for cleaning to maintain efficient detection and thus avoid false alarms. The detector includes a water sensor, comprising of a resistivity meter, a radio-transmitter for transmitting to the control unit 10, a non-rechargeable lithium battery for a minimum operating life of 4 years, a push button 65 for the testing and installation of the device, a signalling LED 66 and a periodic transmitter for transmitting to the control unit 10 the operating status with battery diagnosis.

[0049] The detection and signalling system, according to the present invention, may after all include a radio repeater 81, one or two exterior buzzers 73, one or two receivers with relay output 74 and two radio remote controls.

[0050] The radio repeater 81 ensures the operation of the system under any installation conditions, also when radio transmission is difficult due to the distance between some system components and the control unit 10. Advantageously the addition of one or more of these devices by the system installer always renders the system produced wholly functional and efficient.

[0051] The radio repeater comes equipped with non-rechargeable batteries for a minimum operating life of 4 years, under normal operating conditions, and must be installed in the most suitable points to guarantee the coverage of the desired system.

[0052] The exterior buzzer 73 is the alarm signaller device suitable for wall mounting outside the building in which the control unit 10 is installed; this incorporates the proper siren and flashlight. The device is built for wall installation with screws and dowels and does not require any wiring up to the mains network, since it is self-powered by independent batteries which guarantee long-term functioning.

[0053] The exterior buzzer 73 includes a radio receiver of the alarm from control unit 10 and a radio-transmitter for transmitting to the control unit 10 signals relative to the tamper conditions and battery status, a non-rechargeable lithium battery for a minimum operating life of 4 years, an anti-opening and anti-removal protection device, an alarm signaller with an acoustic power of at least 100dB, a dual anti-foaming case comprising of a shockproof polycarbonate external shell and an internal galvanized frame.

[0054] The receiver with relay output 74 is a device which receives alarms generated by control unit 10, able to operate a relay output, allowing the control of electric actuators of any kind.

[0055] The device can be programmed by the control unit 10, so that it is activated following an alarm generated by one of the various possible causes, namely a break-in, tampering, presence of methane gas, carbon monoxide, fire or flooding. It includes a radio receiver of the alarm from the control unit 10 and a radio-transmitter for the control unit 10 of battery status, a non-rechargeable lithium battery for a minimum operating life of 4 years, an anti-opening and anti-intrusion protection device.

[0056] The radio remote controls 72, 82 are of two types, a teleassistance remote control, 72 and a remote control for the activation or deactivation of the system 82.

[0057] The teleassistance remote control, 72 is a single key radio remote control which is used to operate the alarm from anywhere in the building; it can be programmed to generate two different alarm types, corresponding to two push buttons 20, 21 of the control unit 10, of health and police assistance.

[0058] The control unit 10 is programmed at the factory so that the radio remote control supplied activates the health assistance alarm.

[0059] Subsequently, the activation and deactivation remote control of the entire system 82, is a dual key radio remote control and is used for the activation and deactivation of the surveillance status of the anti-intrusion system; by pressing a push button (usually red) the control unit 10 activates the system, whereas pressing a push button (usually green) puts the control unit 10 in a rest status.

[0060] The operation of the automatic detection and signalling system of dangerous or emergency situations is outlined in the diagram of figure 12 in which the arrows denoted by reference R, in one direction or another, denote a radio connection between the system components, while the arrows denoted by C refer to the wiring existing between the control unit 10, a public telephone network and an indicator 71 showing the presence of power supply in the domestic system.

[0061] First of all, the control unit 10 can be programmed so that, in the event of alarm, it is automatically connected to an operations centre for the

reception and coordination of the alarms, or simply calls a list of telephone numbers, set by the user, to which vocal alarm signals are sent indicating the causes of the alarm generated.

[0062] All teleassistance functions are always operative for any control unit 10 status; to use these functions it is sufficient to have the control unit 10 and the radio remote control 72 supplied for the request for assistance, allowing the remote activation of one of the scheduled teleassistance functions.

[0063] Where health assistance is required, the user presses the corresponding push button 20 of the control unit 10 or a radio remote control push button 72 programmed for this function.

[0064] Immediately after pressing the push button of the control unit 10 or of the remote control 72, the control unit 10 provides confirmation for the client of alarm activation by means of short beeps and starts alarm transmission over the telephone line 70, according to the following methods.

[0065] In the event in which utilisation of an operations centre is envisaged, the control unit 10 immediately sends a telephone call to the operations centre where, after about ten seconds, the client and alarm type are automatically identified and the operator coordinates the assistance by simultaneous viva voce communication with the client and by telephone with the helpers.

[0066] Immediately upon receipt of the alarm, the operations centre operator is able to consult, on a computer screen, a box containing the personal and anamnestic details of the client and the references in the case of alarm; therefore the operations centre can also notify the external references supplied by the client.

[0067] In the event in which an assigned operations centre is not envisaged, after pressing the same key indicated previously, the control unit 10 sends a telephone call to the first telephone number programmed by the user and reproduces a synthesized voice announcement of health assistance.

[0068] After the message has been repeated a few times, the control unit 10 automatically activates the viva voce mode, so the person called can communicate directly with whom has requested assistance.

[0069] The same alarm procedure is performed for all the memorized telephone numbers and the person called can interrupt the alarm stage by the successive pressing of a series of predetermined keys on their telephone, thus sending coded confirmation of having received the alarm message.

[0070] The same procedure can be started, through an appropriately assigned operations centre or by means of simple synthesized voice messages, after pressing push button 21 of the control unit 10, relating to a request for police intervention, or using the radio remote control 72 programmed for this function.

[0071] In this case, in particular, the control unit 10 can be programmed so that, after pressing push button 21, the control unit 10 carries out all the communication operations in silence, without activating acoustic signallers, exterior sensors 73 and/or the speaker in the viva voce mode (anti-theft alarm) or so that the same control unit 10 activates an acoustic signaller confirming the pressing of push button 21 (general alarm) or so that the control unit 10 immediately activates the buzzer 73 of the system (anti-aggression alarm to discourage any suspicious individuals present) and subsequently switches off the buzzer 73 when viva voce communication is started.

[0072] An identical procedure, in the event of implementation both through an operations centre and vocal synthesis means, occurs after pressing push button 22 of the control unit 10 to request service due to technical alarm.

[0073] The anti-intrusion devices monitor the security of the building by means of the volumetric detectors 48, appropriately installed in the various rooms, and the perimetric detectors 78, 79 installed at the points of entry; at least one remote control 82 is required to control the system for the connection/disconnection of the system and, in this manner, the system can be set, through the operation of the control unit 10, in various operating states: system deactivated (rest status), in which the control unit 10 only monitors in the event that tampering of the various system components does not occur, immediately activating a tamper alarm as soon as such a situation is detected in one of the system components. The control unit 10 is deactivated by pressing the green key of the remote control 82.

[0074] When the system is activated, the control unit 10 is ready to manage break-in alarms; as soon as an alarm indication is received by any one of the system's anti-intrusion devices 48, 78, 79, the control unit 10 activates the exterior buzzer 73 and its communication devices. The control unit 10 is activated by pressing the red key of the remote control 82.

[0075] In addition, the system can be operated in night mode, in which the control unit 10 is ready to manage break-in alarms, as soon as an alarm indication is received by one of the anti-intrusion devices belonging to the night zone of the system (such effect is defined during the system programming stage). In the alarm status, the control unit 10 activates the buzzer 73 and its communication devices and is set to night mode by pressing a certain sequence of keys of the remote control 82. In any case, the green key of the remote control 82 must be pressed to reset to rest status.

[0076] The following alarm causes can be operative in the event of anti-intrusion.

[0077] First of all, the tamper information transmitted by the volumetric anti-intrusion detectors 48 or by the perimetric detectors 78, 79 immediately sets off an anti-intrusion alarm. In such case the control unit 10 immediately activates its own siren, the exterior buzzer 73 and the other actuators 74 of the system; if the unit 10 is not activated no call results over the telephone

line, whereas if the control unit 10 is activated, it is set to communication mode in the following manner.

[0078] In the event in which the use of an operations centre is envisaged, the activation of the control unit 10 allows the immediate transmission of a telephone call to the operations centre, from where the call is automatically redirected to the police with an indication of the cause of the alarm. The operations centre operator, upon police request, is ready to supply useful information to optimise police intervention.

[0079] Having established the connection, the police can monitor any noises in the building by listening with the aid of a microphone.

[0080] In addition, the operations centre operator is able to, upon police request, and following receipt of the alarm, immediately consult a box containing the personal details of the client and any references indicated by the same, which can be notified.

[0081] If there is no intermediation of an operations centre, the control unit 10 sends the telephone call to the first telephone number programmed by the user and repeats a synthesized voice message relating to a tampering incident.

[0082] After the message has been repeated a few times, the control unit 10 automatically activates the remote listening mode, so that the person called can check, through the microphone of the control unit 10, the presence of any noises in the building.

[0083] The same alarm procedure is performed for all the memorized telephone numbers; the person called can interrupt the alarm stage by pressing a set sequence of keys on their telephone and thus confirming receipt of the alarm message.

[0084] The information of the presence of persons or information indicating violation of the perimeter protection is transmitted by the volumetric anti-intrusion detectors 48 immediately setting off an anti-intrusion alarm when the control unit 10 is activated.

[0085] Normally, the control unit immediately activates its own siren, the exterior buzzer 73 and the other actuators 74 of the system and, at the same time, starts communication over the telephone line, with the same methods previously described concerning the tamper alarm.

[0086] Finally, as for the anti-intrusion alarms, it is possible to programme the control unit 10 so that, in the event of alarm, the operation allows immediate siren activation and, at the same time, the telephone call or immediate activation of the telephone call with the siren being activated after about 1 minute, or activation of the telephone call alone.

[0087] All the functions relating to the ambient alarms (gas, fire, flood) are always operative, in any status of the control unit 10.

[0088] The gas alarm is the condition which occurs automatically following the alarm transmission of a gas detector 77 (methane and carbon monoxide) with built-in emergency lamp.

[0089] In such case, the control unit 10 immediately sounds an alarm signal by means of the buzzer and if necessary controls also the exterior buzzer 73 and the other system actuators. At the same time, the control unit 10 starts alarm transmission in viva voce telephone line mode according to the procedure described previously.

[0090] The fire alarm is the condition which automatically occurs following alarm transmission by a smoke detector 76.

[0091] In such case, the control unit 10 immediately generates an alarm signal by means of the siren and if necessary controls also the exterior buzzer 73 and the other system actuators. At the same time, the control unit 10 starts alarm transmission in viva voce telephone line mode according to the procedure described previously. The flood alarm is the condition which occurs automatically following the alarm transmission of flood detectors 75.

[0092] In such case, the control unit 10 immediately generates an alarm signal by means of the siren and if necessary controls also the exterior buzzer 73 and the other system actuators, in particular a relay actuator may be controlled 74, which closes a solenoid valve of the water system).

[0093] At the same time, the control unit 10 starts alarm transmission in viva voce telephone line mode, according to the same call procedure to an operations centre or the calling of a series of telephone numbers programmed by the user.

[0094] Finally, the base control unit 10 is equipped, with a sensor of the 230 Volt domestic electrical power supply, allowing the operations centre or assigned telephone numbers to be notified, in the case of a prolonged interruption in power; this function is useful for the remote signalling of a problem which could cause serious damage, such as the thawing of foodstuffs or operation faults in domestic electrical systems.

[0095] Should the control unit 10 be suitably programmed in the absence of electrical power for at least 4 hours, the control unit 10 starts alarm transmission, using the telephone line, to the operations centre so as to identify the alarm type and location of the client, or to each telephone number programmed by the user, reproducing a synthesized voice message.

[0096] In the event of an automatic detection and signalling system being used without connection to an operations centre, then different telephone numbers are called for each different alarm type, relating to the following classes: anti-intrusion and emergency services alarms (the same telephone numbers are called for these two causes), ambient alarms, health assistance requests, technical intervention requests, power-cut alarms; in total 8 telephone numbers are available which are called in the event of alarm, each associated with various causes, and programmable by the user.

[0097] The LEDs denoted by 17 in figure 1, 3-6 (usually green, red and yellow) signal the functioning

and diagnostics, respectively, of the anti-intrusion system (system connected, system disconnected, break-in alarm), of the ambient security system (gas alarm, fire alarm, flood alarm) and of the control unit 10 in general (malfunction, flat battery).

[0098] In particular, a disconnected system is signalled by a green LED 17, flashing for a few seconds after deactivation and only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of disconnected system power or unlit in the absence of power.

[0099] A connected system is signalled by a flashing red LED 17 during the activation and during the alarm and only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of connected system power or unlit in the absence of power.

[0100] A break-in alarm is signalled by a red LED 17 flashing for a few seconds following deactivation of the control unit 10, if a break-in or tamper alarm is memorized and, only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of deactivated control unit 10 power, following a memorized break-in or tamper alarm or switched off in the absence of power.

[0101] A malfunction is signalled by a short periodic flashing yellow LED 17 if the control unit 10 is deactivated following a malfunction of a system detector and, only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of deactivated control unit 10 power, following the malfunction of a sensor or switched off in the absence of power.

[0102] The signalling of a flat battery is indicated by a short periodic flashing yellow LED 17 if the control unit 10 is deactivated following the location of a flat battery in the system (of a detector or the control unit, in battery operated models) and, only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of a deactivated control unit 10 power, following the location of a flat battery alarm in the system or switched off in the absence of power.

[0103] The gas alarm is signalled by a short periodic flashing red LED 17 following a memorized gas alarm and, only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of power, following a memorized gas alarm or switched off in the absence of power.

[0104] The fire alarm is signalled by a short periodic flashing red LED 17 following a memorized fire alarm and, only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of power following a memorized fire alarm or switched off in the absence of power.

[0105] The flood alarm is signalled by a short periodic flashing red LED 17 following a memorized flood alarm and, only in the event of the built-in version of control unit 10, the LED 17 lights up in the presence of a memorized flood alarm or switched off in the absence of power.

[0106] Consequently, for each generic event signalled by the lighting of one of the LEDs 17 it is possible to investigate the cause relating to such an indication by examining the control unit 10 which, by means of the speaker located at the grille 15, emits explanatory synthesized voice messages in accordance with the code associated with each alarm; for example, in the event of a tamper alarm being memorized, the control unit 10 shows the indication on the LED 17 corresponding to a break-in alarm, which lights up, and appropriate examination of the control unit 10 makes it possible to identify the detector device which sounded the tamper alarm.

[0107] In such case, each detector is identified by a number and if, for example, the detector 5 caused the problem, the control unit 10 will emit the vocal message: "alarm detector 5, tampering". Subsequently, such messages can be personalised by the user recording his/her own voice.

[0108] In addition, an acoustic signaller of the control unit 10 allows the emission of a "beep" with characteristic tones of each activation or deactivation of the anti-intrusion system, and helps to understand if defects related to the system or memorized alarm operation are present. In fact, when operation defects are present, the control unit 10 emits signals differing from the usual ones, thus attracting the user's attention.

[0109] Lastly, with the wall-mounted version of the system, the control unit 10 can be used to enter an automatic standard prefix (similar to those used by telephone companies) for each call made with the telephone cascade connected to the same control unit.

[0110] In fact, the control unit 10 is connected to the telephone line 70 by a connection which intercepts the line previously connected to the pre-existing telephones; hence the control unit 10, only in the built-in version, is able to automatically analyse each telephone number dialled by a system telephone and, if suitably programmed, having recognised it then precedes it with the appropriate prefix of the telephone company chosen by the user. For example, if a user from Milan (city code 02), dials the number 039 456732, and the user happens to be with a telephone company using the prefix 10987, the built-in control unit, having recognised a call outside the city area one belongs to, would automatically change the number dialled by adding the prefix 10987, thus dialling the correct sequence 10987/039/456732 necessary to use the service of the telephone network company supplying the telephone service.

[0111] The description provided makes clear the characteristics of the detection and signalling system of dangerous or emergency situations, which is subject of the present invention as, likewise, its advantages prove apparent.

[0112] In particular these are represented by:

- flexibility, simplicity and speed of installation, programming and wiring of the system;

- versatility of use of the system on existing systems, ease of integration with other electronic systems and simplicity of use;
- speed of intervention upon rapid signalling of the emergency received;
- possibility of quickly locating the position from which emergency calls are made;
- compliance with respect to national and international legislation in terms of electrical security;
- limited costs compared to the known techniques, in virtue of the advantages gained.

[0113] It is clear, however, that numerous variations can be made to the detection and signalling system, subject of the present invention, without leading away from the innovative principles of the invention, as it is clear that, in the practical implementation of the invention, any materials, forms and dimensions of the details illustrated may be replaced with other technically equivalent ones

Claims

1. An automatic detection and signalling system of dangerous or emergency situations including at least one central base unit (10), which is able to make a series of telephone calls to at least one call-centre which puts through said calls, or to telephone numbers, programmable by a user, allowing direct communication between the caller and the person called, characterised in that the signalling means (17) of at least one alarm and communication devices (15, 20-23, 72, 82) remote from said alarm are incorporated in a single base unit (10).

2. A detection and signalling system as in claim 1, characterised in that said base unit (10) is produced in a wall mounted version or a wired wall or table-top version.

3. A detection and signalling system as in claim 1, characterised in that said communication devices (15, 20-23, 72, 82) include a number of push buttons (20-22) activating different telephone calls depending on the different types of alarms generated.

4. A detection and signalling system as in claim 3, characterised in that said communication devices (15, 20-23, 72, 82) include at least one push button (23) enabling the cancellation of said calls.

5. A detection and signalling system as in claim 3, characterised in that said telephone calls are relative, respectively, to a request for health assistance, a request for police intervention following aggression or a request for maintenance intervention.

6. A detection and signalling system as in claim 1, characterised in that said base unit (10) incorporates a telephone line sequence switch (70), which allows automatic connection with said operations centre, or the sending of voice telephone calls, directly to programmed telephone numbers, including pre-recorded vocal alarm messages.

7. A detection and signalling system as in claim 3, characterised in that said communication devices (15, 20-23, 72, 82) include at least one radio remote control (72, 82) activating said push buttons (20-22) of alarm and/or activation or deactivation of an anti-intrusion system.

8. A detection and signalling system as in claim 1, characterised in that said base unit (10) incorporates at least one alarm siren, an acoustic signaller of functioning defects of the system, a loudspeaker for reproducing vocal messages and a series of visual signalling user LEDs (17) of the status of said base unit (10).

9. A detection and signalling system as in claim 1, characterised in that said base unit (10) includes at least one voice synthesis device for diagnostics and/or maintenance signalling.

10. An automatic detection and signalling system as in claim 1, characterised in that said base unit (10) includes at least one viva voce device for allowing conversation, through a telephone line (70), with an operator of said operations centre or with a receiver of said telephone calls.

11. A detection and signalling system as in claim 1, characterised in that said base unit (10) includes at least one microphone for detecting ambient noises during an alarm.

12. A detection and signalling system as in claim 1, characterised in that said base unit (10) incorporates at least one anti-opening and tamper-proof protection device.

13. A detection and signalling system as in claim 2, characterised in that said base unit (10) is built into the wall and includes at least one autonomous emergency lamp or torch (18), extractable from the frame (11) and battery rechargeable, in the absence of mains power.

14. A detection and signalling system as in claim 2, characterised in that said base unit (10) is of wire wall mounted or table-top version and is powered by non-rechargeable batteries.

15. A detection and signalling system as in claim 1,

characterised in that said base unit (10) is connected via radio to a series of anti-intrusion and/or ambient (75-77) detectors (48, 78, 79) with at least one external buzzer (73), with at least one alarm actuator and with at least one relay output for the piloting of electric actuators (74).

16. A detection and signalling system as in claim 15, characterised in that said anti-intrusion detector means (48, 78, 79) include at least one adjustable device (48) for wall mounting, equipped with a passive infrared sensor for the volumetric detection of surroundings and transmission of an alarm to said base unit (10), at least one magnetic anti-intrusion detector (79) for closed doors and windows and at least one summer anti-intrusion detector (78) for open doors and windows.

17. A detection and signalling system as in claim 15, characterised in that said ambient detectors (75-77) include at least one gas detector (77) with a built-in emergency lamp, at least one smoke detector (76) and at least one flood detector (75).

18. A detection and signalling system as in claim 1, characterised in that said signalling means (17) include LEDs for the light indication and diagnostics of said system, which signal the connection and disconnection of the system, an anti-intrusion alarm, system malfunction and flat battery indicators, gas alarm, fire and flood alarms.

19. A detection and signalling system as in claim 15, characterised in that each alarm produced by said detectors (48, 78, 79, 75-77) is coded, so that it is possible to identify at least one of said detectors (48, 78, 79, 75-77) that caused the alarm.

20. A detection and signalling system as in claim 1, characterised in that said base unit (10) incorporates a sensor (71) of the presence of 230 Volt power of the domestic electrical system.

Fig.1

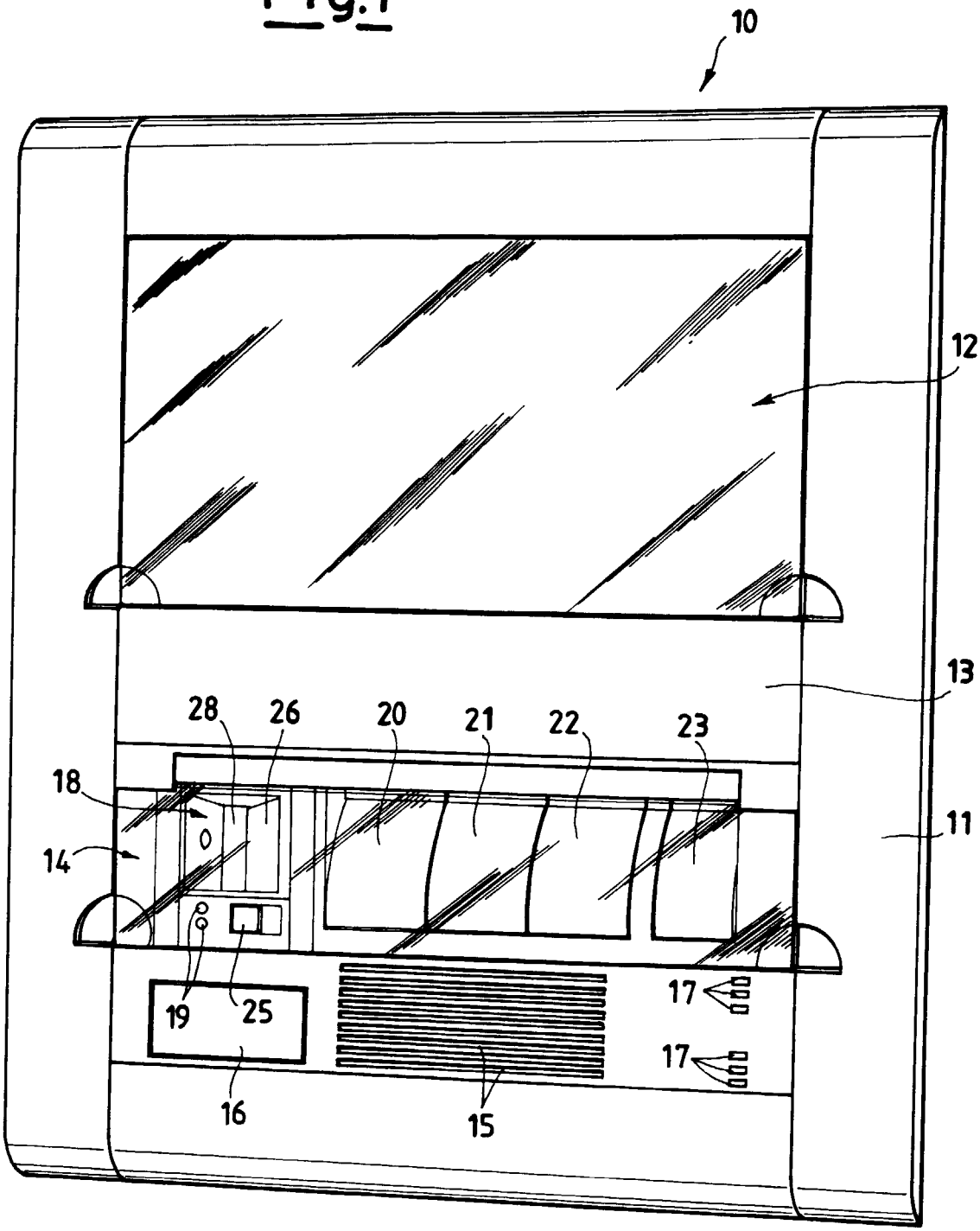
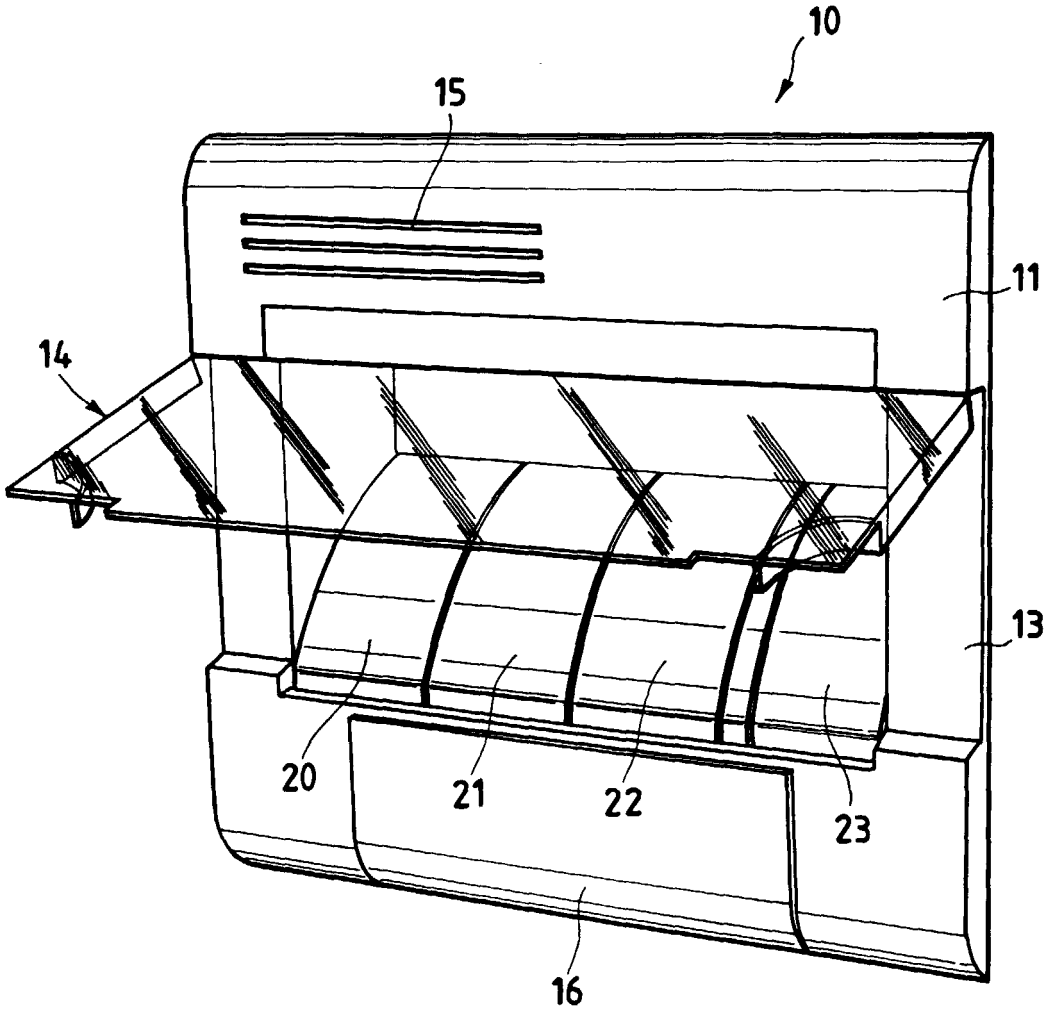


Fig.2



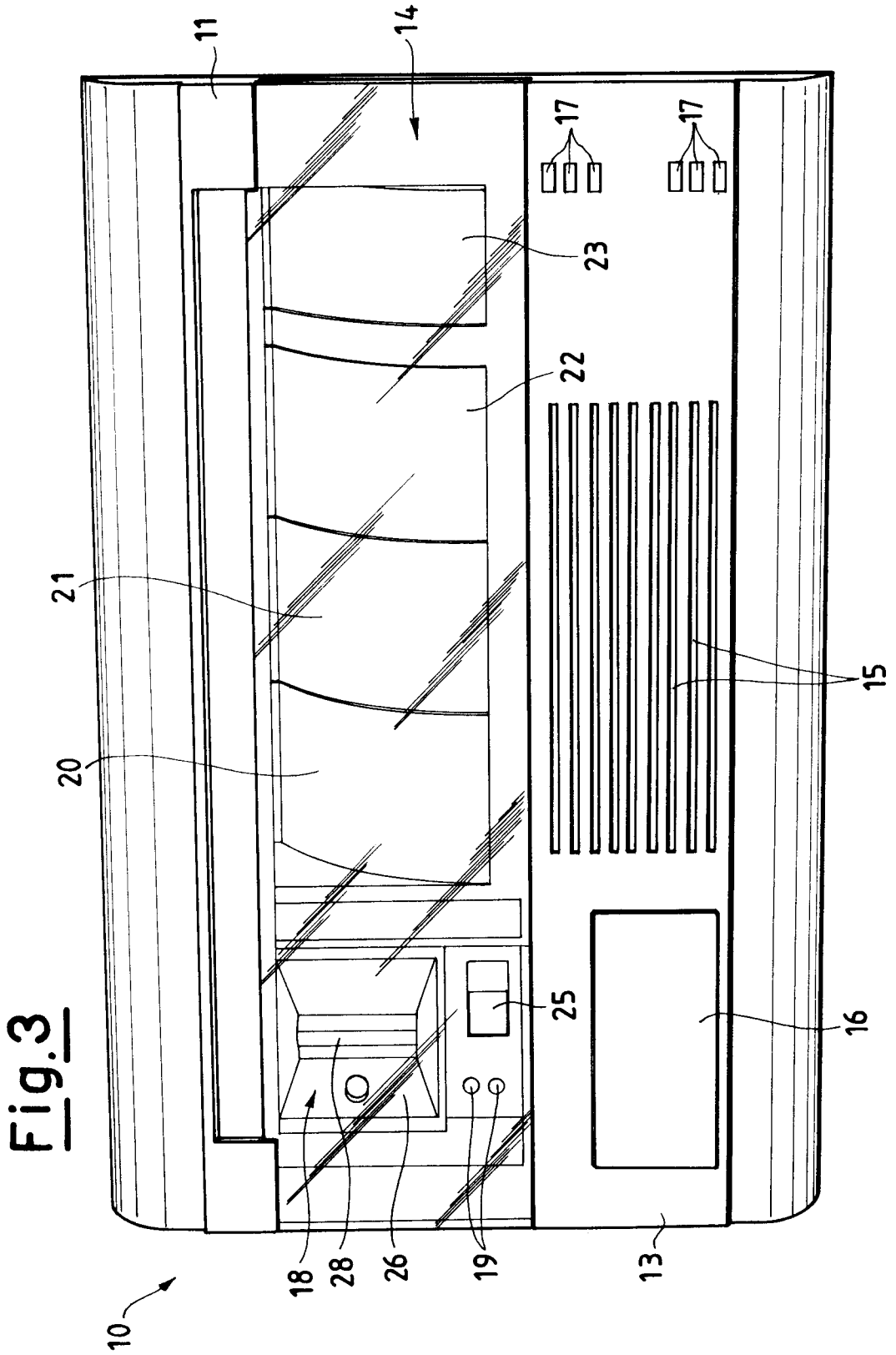


Fig.3

Fig.4

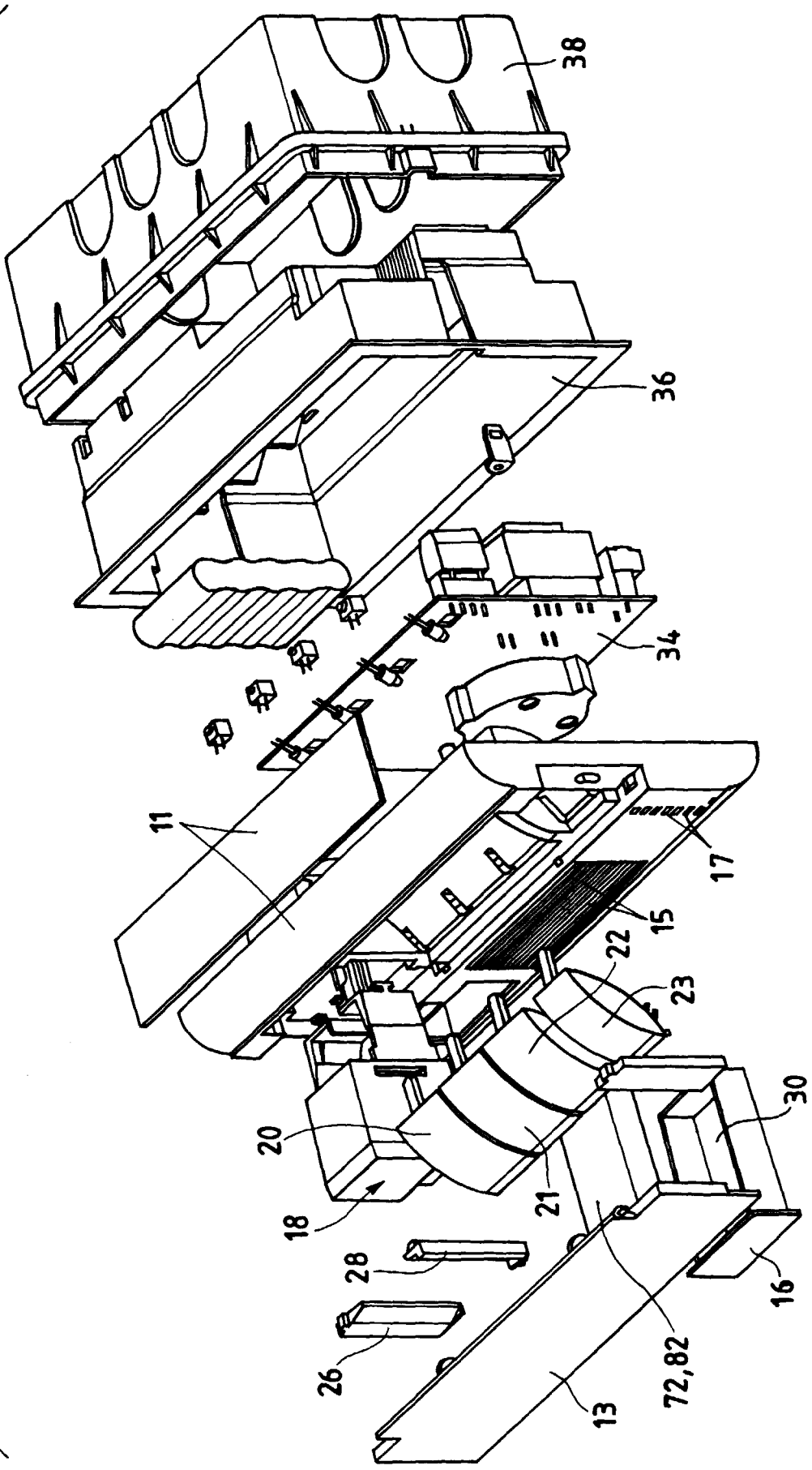


Fig.5

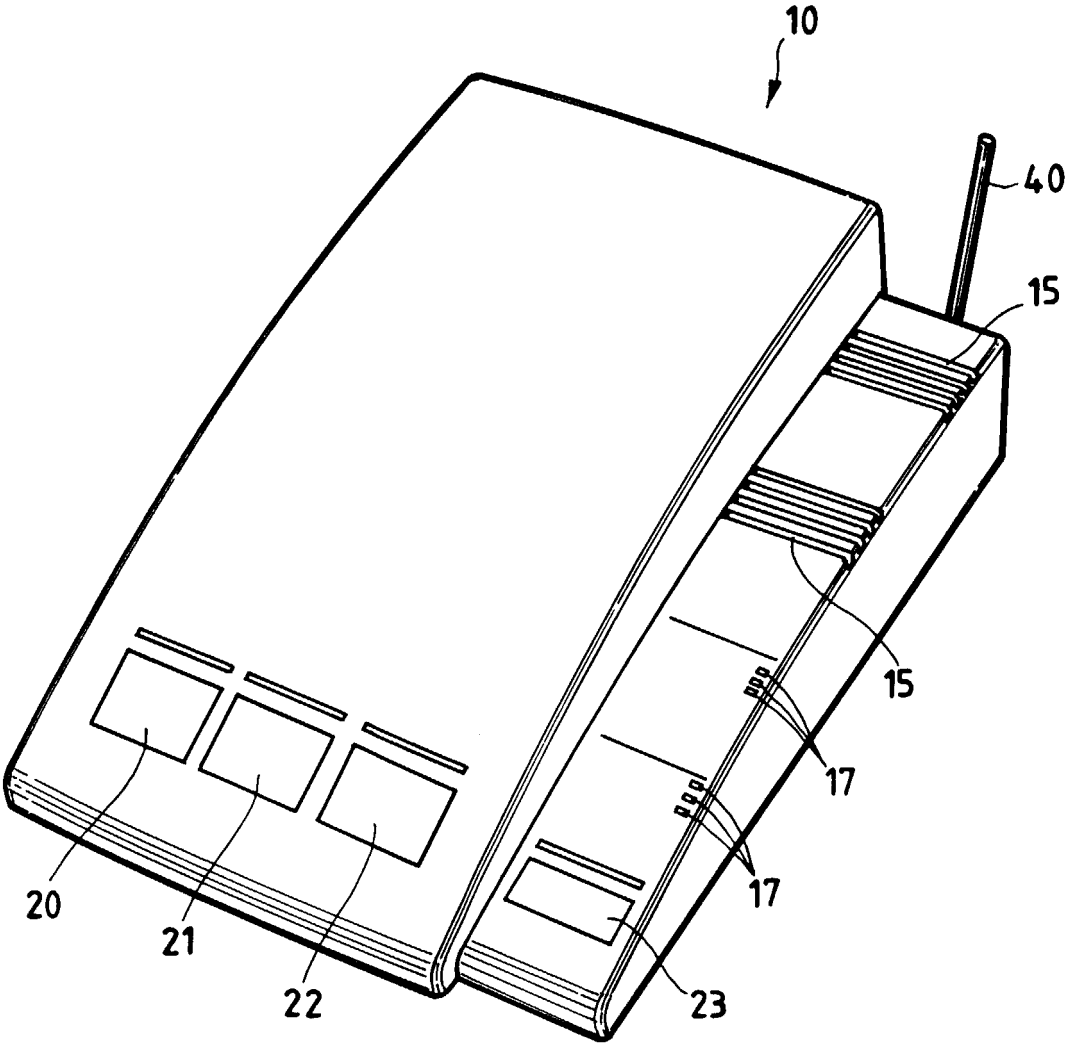


Fig.6

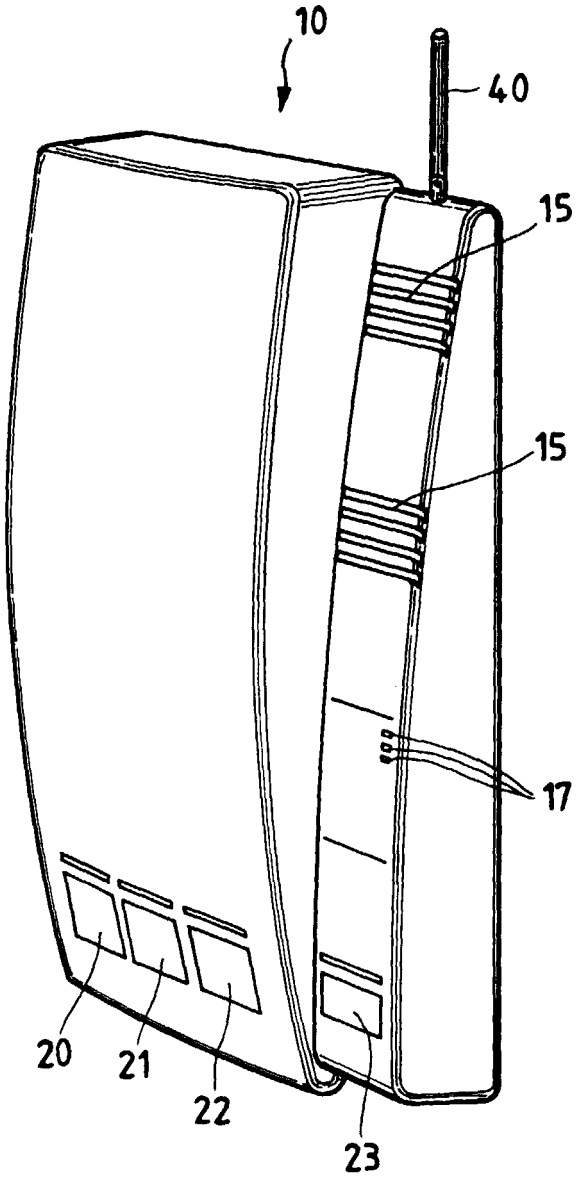


Fig.8

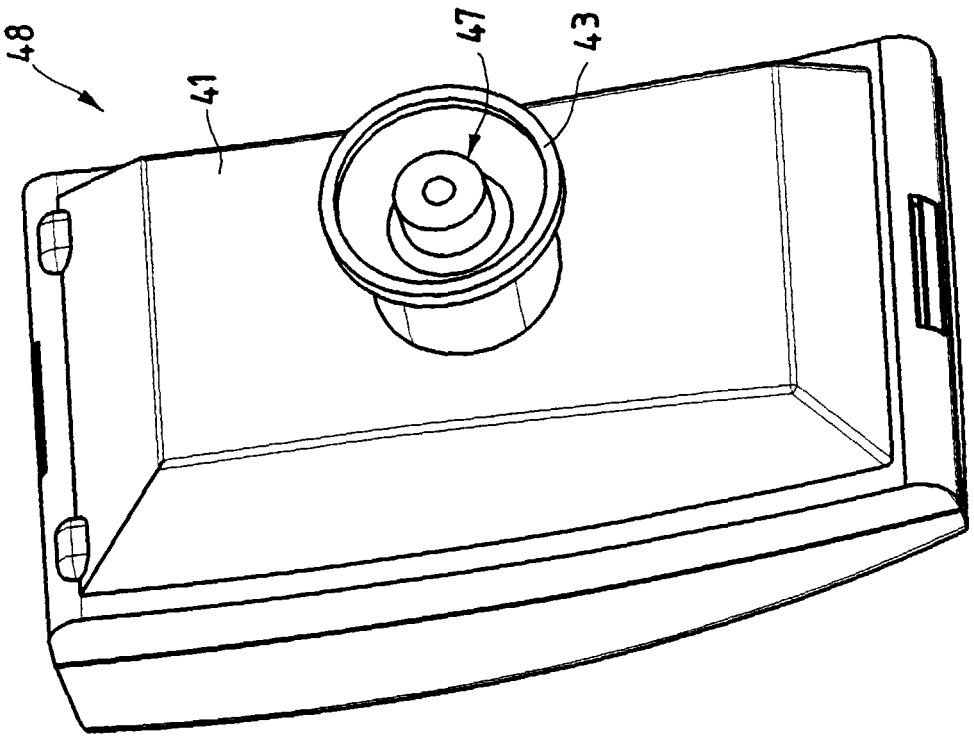


Fig.7

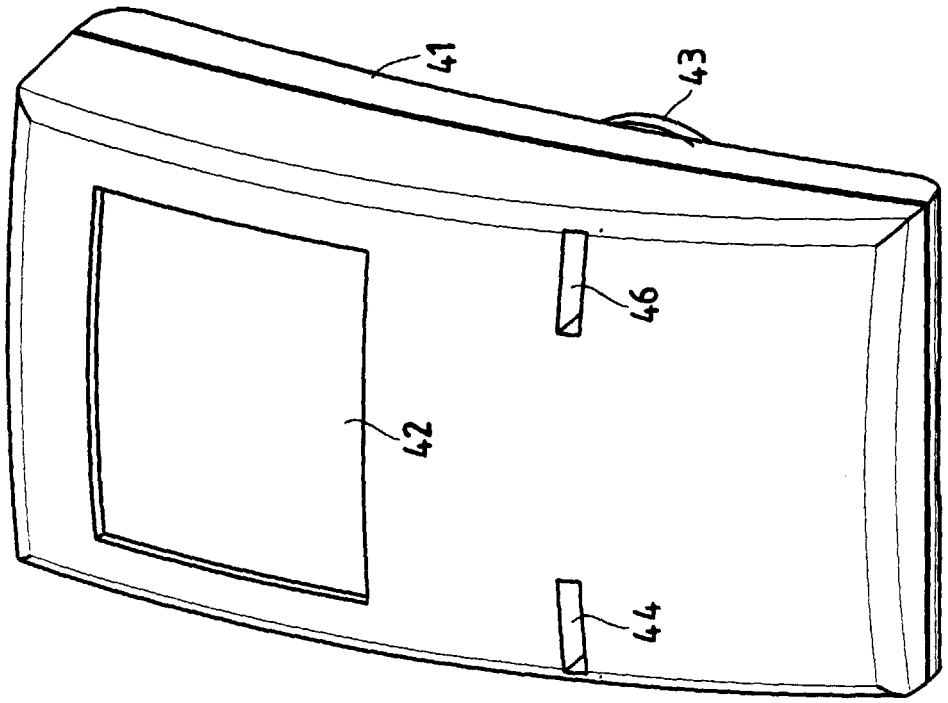


Fig.9

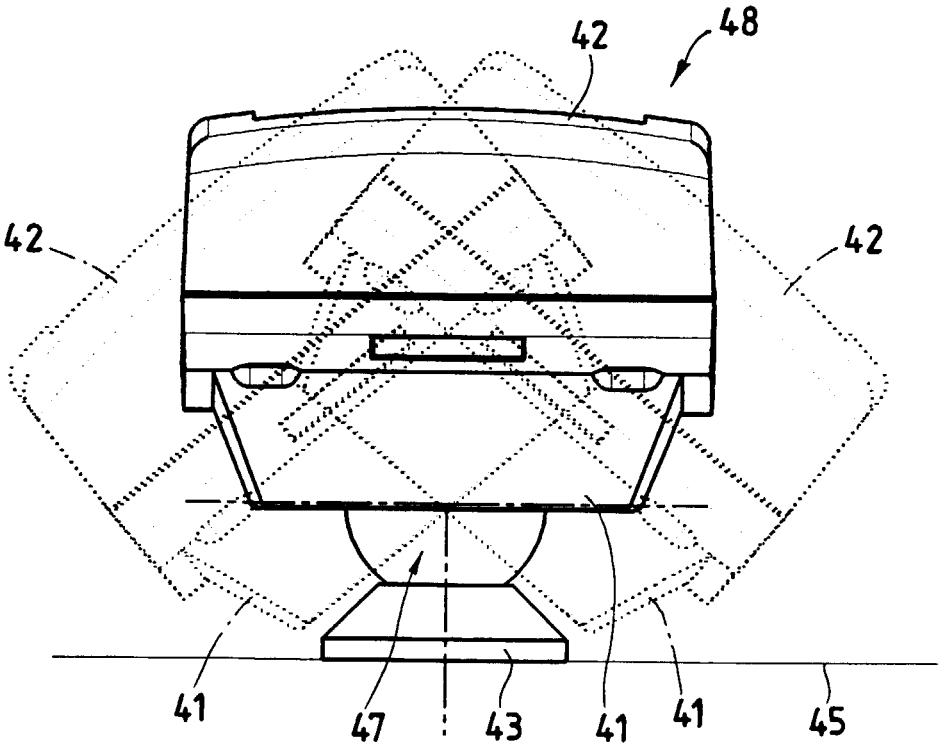


Fig.10

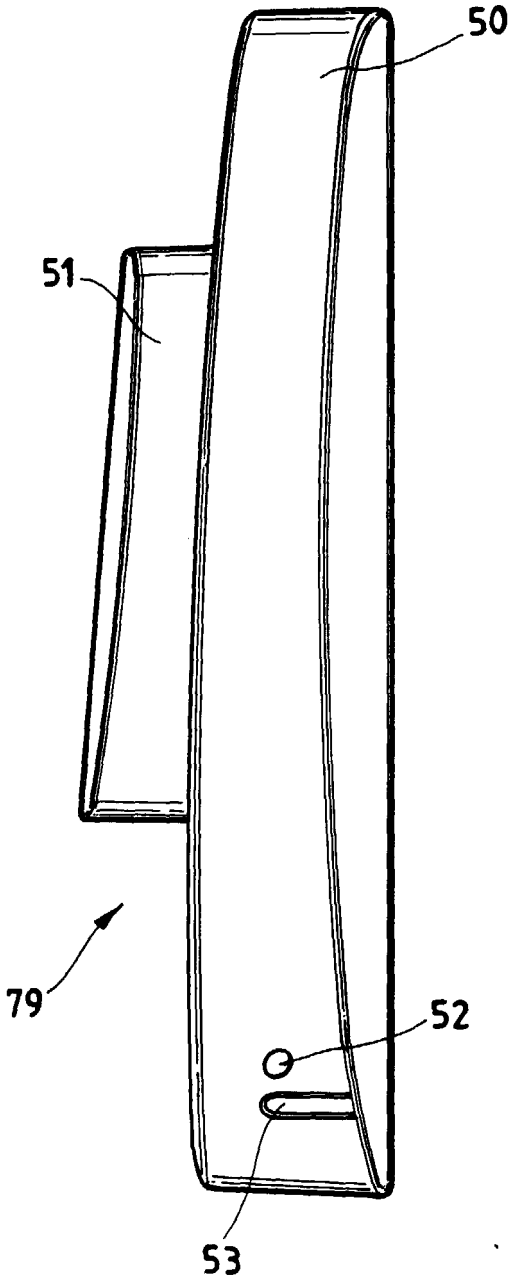


Fig.11

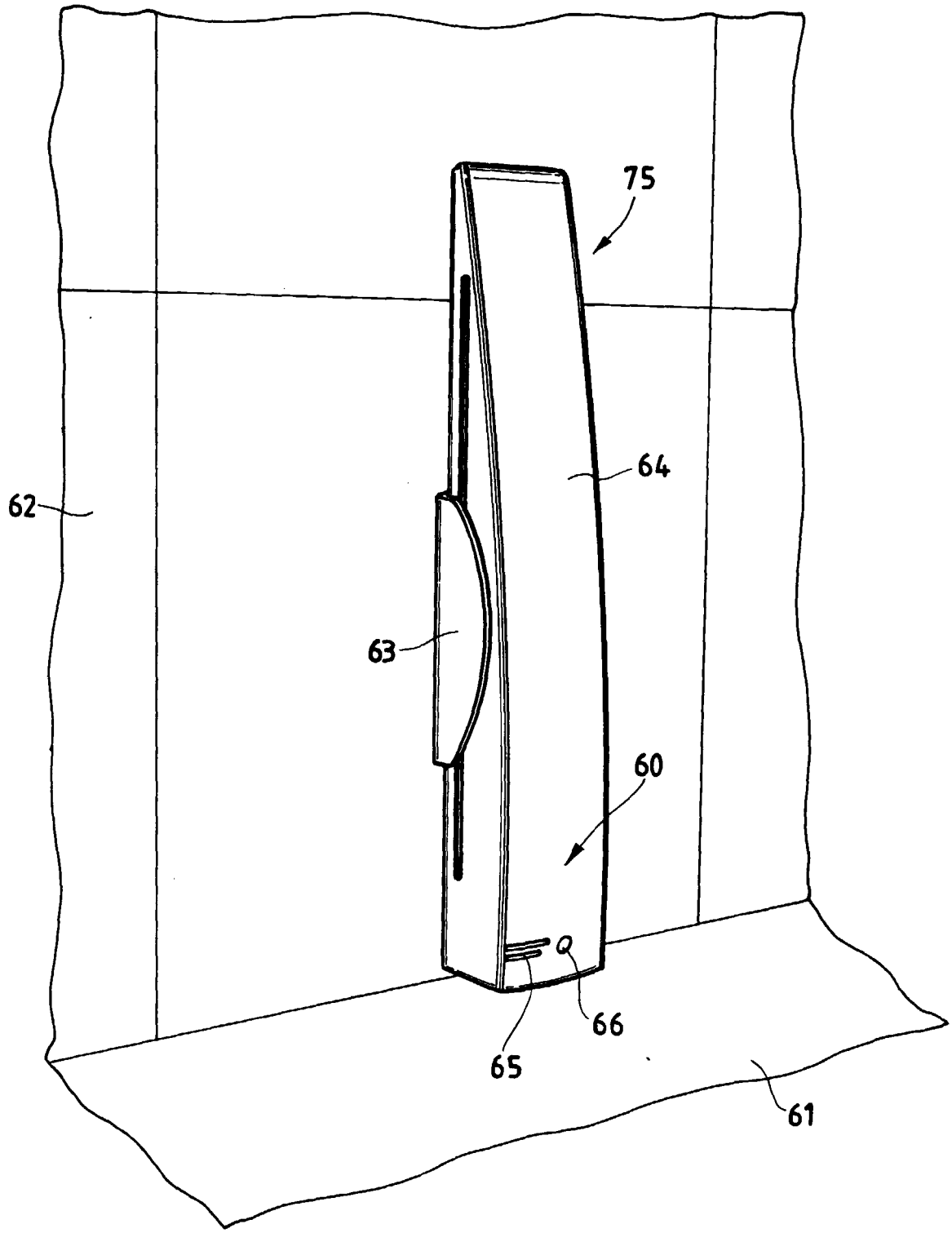


Fig.12