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(54) **Title**: MULTIFUNCTION PROTECTIVE HELMET

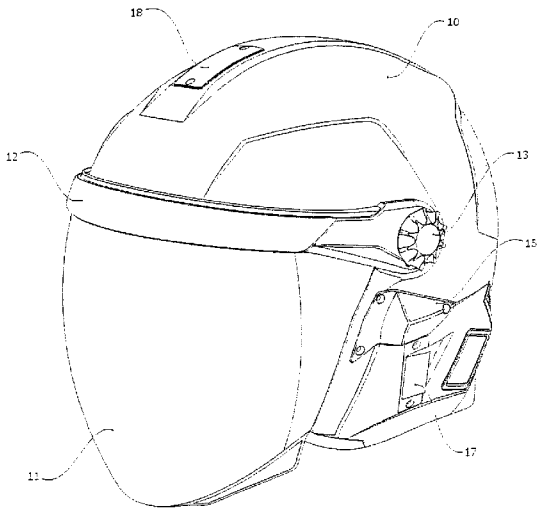

Fig. 1_a

(57) **Abstract**: The device object of the present invention is a multifunction safety helmet, in particular for crowd control and anti-riot activities, adapted to provide the user with maximum comfort while at the same time guaranteeing complete protection from blows and impacts and maximum flexibility of use. The helmet object of the present invention may find advantageous application not only in the security sector (police, traffic wardens, etc.) but also in the sector of rescue workers, such as, for example, doctors and paramedics on board ambulances, speleologists, fire - fighters, stewards in service at sporting events, pit lane crew members at motor races, as well as in the sporting sector in general and the motorcycle sector in particular. Furthermore, the safety helmet according to the present invention may be produced in various scalable versions so as to adapt to the various requirements which may arise, having supplementary apparatuses mounted thereupon and adapted to perform additional functions to assist the user.

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MULTIFUNCTION PROTECTIVE HELMET

Field of the invention

The present invention relates to the technical field of safety helmets and hats, with particular reference to the field of helmets which are used in the sector of security and rescue.

State of the art

For an agent of the security forces, the helmet constitutes the main form of protection during the performance of crowd control and anti-riot activities.

The helmets intended for this specific use which are currently supplied to the security forces of the various countries of the world are, in almost all cases, designed for other purposes and adapted, often superficially, to the requirements of anti-riot activities.

Such adaptations can be fundamentally ascribed to just two types: the ballistic helmet and the motorcycle helmet.

The ballistic helmet was conceived in order to protect the user's head from direct and indirect firearm shots and bullet fragments; it is rather unstable during movement and offers little protection to the face and the back of the neck. It is usually adapted for anti-riot use by means of the application of a front transparent shield.

The other type of existing helmet is a classic motorcycle helmet, and as such was conceived to protect the head from a single violent impact in the event of a road accident, having the merits of a high level of sound insulation and guaranteeing a certain amount of internal ventilation by taking advantage only of the speed of the vehicle.

The main features and merits of these helmets in the respective fields of use, such as, for example, the high resistance to firearm shots or to violent high-speed impacts, become superfluous and redundant features in crowd control and anti-riot activities, and at times are even counterproductive and dangerous. For example, the sound insulation of a motorcycle helmet makes it difficult to hear orders and ambient noises, while the possibility of dissipating body heat from within, normally subject to the speed reached by the vehicle used by the person wearing the helmet, may be a cause of excessive heating and therefore of discomfort for the

user who is on foot.

The helmet object of the present invention overcomes the described disadvantages and may find advantageous application not only in the security sector (police, traffic wardens, etc.) but also in the sector of rescue workers, such as, for example, doctors and paramedics on board ambulances, speleologists, fire-fighters, stewards in service at sporting events, pit lane crew members at motor races, as well as the sporting sector in general and the motorcycle sector in particular.

Brief description of the figures

Fig. 1_a shows a first perspective view of the helmet object of the present invention.

Fig. 1_b shows a second perspective view of the helmet object of the present invention.

Fig. 2 shows a side view of the helmet object of the present invention.

Fig. 3 shows a functional block diagram of a preferred embodiment of the control circuitry integrated into the helmet object of the present invention.

Summary of the invention

The present invention concerns a multifunction safety helmet, in particular for crowd control and anti-riot activities, adapted to provide the user with maximum comfort and, at the same time, guaranteeing complete protection from blows and impacts and maximum flexibility of use thanks to the ample presence of integrated electronic circuitry, adapted to automate, perform and manage a large number of functions which can be controlled by the user.

Detailed description of the invention

The device object of the present invention is a multifunction safety helmet, in particular for crowd control and anti-riot activities, adapted to provide the user with maximum comfort while at the same time guaranteeing complete protection from blows and impacts and maximum flexibility of use. The main features of the safety helmet according to the present invention are:

- Efficient dissipation of a large fraction of the energy of an impact and the slowing down of the transmission thereof towards the user's skull, so as to substantially limit potential injury to said user.

- Protection of the user's face from the throwing of solids, liquids or fluids.
- Efficient dissipation of body heat from the user's head.
- Total compatibility and capacity to interface with the user's additional individual equipment.
- Capacity to integrate with reception, recording and transmission equipment for audio and video communications.

The safety helmet according to the present invention may be produced in various scalable versions so as to adapt to the various requirements which may arise, having supplementary apparatuses mounted thereupon and adapted to perform additional functions to assist the user. Said supplementary apparatus comprises, for example, auricular or bone conduction sound receiving apparatuses, laryngophone transmitting apparatuses, LCD micro-screens, micro-image projectors, micro cameras, memory modules for data recording, back-up power modules for the installed electronic apparatuses, high power LED lighting systems, connection interfaces by means of wireless type technology such as Bluetooth, Zigbee, Wi Fi, etc.

With reference to the accompanying figures 1, 2 and 3, the safety helmet according to the present invention comprises a main body 10 – provided by means of a body shell made of shockproof plastic material, preferably constructed from ABS or polycarbonate or with mixtures of polycarbonate-based thermoplastic polymers such as, for example, the material commercially known as Bayblend® – associated with an external visor 11 characterized by a double transverse and longitudinal curvature and, preferably, with a retractable internal sunshield visor, which can be moved manually by the user or automatically. Said external visor 11 is equipped with a reinforcing bar 12, preferably made of aluminium or from a material with similar properties of strength and lightness, fold-away housed within the upper part of said external visor 11, and with a gasket 12, which is also fold-away housed within the upper part of said external visor 11 and not visible, adapted to hermetically seal the upper part of said visor with said main body 10, so as to prevent the possible introduction of dangerous substances from the outside.

Said external visor 11 is hinged in two lateral points of the main body 10 of the

helmet object of the present invention, by means of two adjusting and locking screws 13, 14 and is adapted to be manually raised and lowered by the user by means, for example, of an insert applied directly to said visor 11.

With reference to the accompanying figures 1 and 2, the safety helmet according to the present invention further comprises:

at least two lateral compartments 15, 16, each one adapted to house suitable lighting means, for example comprising at least one high power LED (Light Emitting Diode) adapted to illuminate the space in front of the user of the helmet, possibly with adjustable orientation and possibly with a micro camera adapted to shoot video or take photos from the user's viewpoint;

coupling means, for example, for a gas mask to be applied in case of need, said coupling means being positioned on the right and left sides of said main body 10 of the safety helmet according to the present invention and preferably provided by two housings 17 which are suitably shaped and reinforced and adapted to engage the fixing hooks of the gas mask;

two lateral openings arranged on each side of the helmet according to the present invention, close to the user's ears, and adapted to enable said user to clearly hear voices and noises from the environment;

a compartment 18 positioned on the top of the helmet and adapted to house, according to the various preferred embodiments of the helmet according to the present invention, devices chosen from the group comprising further high power LED devices for illumination or long-distance presence signalling lights, preferably LEDs, antennas and transceiver modules for radio communications, modules for reception / transmission of GPS signals, further video cameras, image projectors, etc.;

a series of pads, positioned on the internal wall of the helmet 10 and having the triple function of contributing to the ability of cushioning blows to the helmet according to the present invention, of rendering said helmet customizable so as to perfectly adapt to the measurements and shape of the user's head, thus facilitating the dissipation of body heat thereof;

an audio module comprising a transceiver system, a microphone – preferably positioned on the left side of the helmet, with an adjustable arm adapted to be

positioned in front of the user's mouth and at least one small loudspeaker positioned close to the ears of the user of the helmet according to the present invention;

at least one keyboard 19, for example of the membrane type, preferably arranged in a lateral position on the surface of said main body 10 of the helmet according to the present invention and in a position which can be easily reached by the user, and adapted to enable the user to interact with the various electronic devices integrated into the helmet;

a series of environmental parameter sensors, for example sensors of temperature, humidity and altitude;

a modem, preferably of the HSDPA type, for connection to the internet and for data connection over the cellular network;

a power module, comprising at least one power supply and a battery, and adapted to provide the voltages and currents required by the existing electronic circuitries.

The helmet according to the present invention finally comprises an integrated and multifunctional electronic control system adapted to manage the operation of the electronic parts integrated into said helmet. In greater detail, said integrated, modular and expandable electronic control system is adapted to handle, for example, the management of signals from the environmental sensors, the lighting provided by said high power LEDs, the Bluetooth interface, any other existing radio interfaces, the audio and video recording and the photo shooting, the geolocation by means of management of the GPS module, any complex environmental monitoring functions by means of management of incoming audio, video and geolocation signals, the data reception and transmission to and from remote communication units, the management of any RFID TAG devices integrated into the helmet for the purpose, for example, of signalling or identifying presences.

The accompanying figure 4 shows a schematic block diagram of the electronic section integrated into the helmet according to the present invention which implements a preferred embodiment of said control section.

A control module 20 is present, based on a microprocessor and associated with suitable power means 22 and with an interface module 21 adapted to enable the

reading of data and the sending of commands to and from the connected peripheral devices.

In one of the preferred embodiments of the multifunction safety helmet according to the present invention, said peripheral devices comprise a microphone 23 and a loudspeaker 24 in order to provide the user with remote audio communications, two keyboards 19, 19_bis, adapted to enable the user to give commands and select between the multiple functions available, a GPS receiver 27 adapted to establish the exact position of the operator, a RFID TAG sensor 28 in order to manage, for example, signalling or identification of presences, a modem 29, for example of the HDSPA type, in order to connect to the internet by means of the cellular data network, a Bluetooth transceiver 31 in order to control devices equipped with a corresponding interface, a temperature sensor 30 and a gas sensor 32 in order to monitor the surrounding environment, a video camera 33 in order to shoot video footage of the surrounding environment which may possibly be saved or remotely retransmitted, a lighting module 34, preferably made with high intensity LEDs and any further external apparatus 35 such as, for example, LCD micro-screens, micro-image projectors, recording memories, back-up power circuitries, etc.

CLAIMS

1. A safety helmet comprising a main body (10) associated with an external visor (11) hinged in two lateral points to said main body (10), said main body comprising lighting means adapted to illuminate the space in front of said helmet; coupling means adapted to connect external auxiliary devices to be applied to said helmet; at least one supplementary apparatus adapted to perform additional functions for assisting the operator of said helmet; a control system adapted to manage the operation of said lighting means and of said at least one supplementary apparatus; a keypad (19) adapted to enable the operator of said helmet to interact with said control system; a power module, comprising at least one power supply and a battery adapted to power said lighting means and said at least one supplementary apparatus.
2. A helmet according to claim 1, wherein said at least one supplementary apparatus adapted to perform additional functions to assist the operator of said helmet comprises at least one device chosen from the group comprising: at least one environmental parameter sensor; at least one antenna and one transceiver module for radio communications; at least one LCD-type micro-screen; at least one micro-image projector; at least one video camera; at least one long-distance presence signalling light; at least one memory module for data recording; at least one back-up power module; at least one wireless-type connection module; a GPS module; an audio system comprising a transceiver system, a microphone and at least one loudspeaker; a modem for connection to the internet and for data connection over the cellular network; at least a RFID TAG sensor.
3. A helmet according to claims 1 - 2, wherein said main body (10) comprises compartments (15, 16, 18) adapted to contain said lighting means and said at least one supplementary apparatus.
4. A helmet according to claims 1 - 3, comprising a retractable internal sunshield visor.
5. A helmet according to claims 2 - 4, wherein said audio system comprises a transceiver system, a microphone equipped with an adjustable arm, adapted

to be positioned in front of the operator's mouth and at least one loudspeaker positioned close to the user's ears.

6. A helmet according to claims 2 - 5, wherein said audio system comprises auricular or bone conduction sound receiving apparatuses.
7. A helmet according to claims 2 - 6, wherein said audio system comprises laryngophone transmitting apparatuses.
8. A helmet according to claims 2 - 7, wherein said wireless-type connection module is chosen from the group comprising communication modules of the Bluetooth, Zigbee and Wi Fi types.
9. A helmet according to claims 1 - 8, wherein said external visor (11) comprises a transversal curvature and a longitudinal curvature.
10. A helmet according to claims 1 - 9, wherein said external visor (11) is equipped with a reinforcing bar (12), fold-away housed within the upper part of said external visor (11), and with a gasket (12), which is also fold-away housed within the upper part of said external visor (11) and not visible, adapted to hermetically seal the upper part of said visor (11) with said main body (10), so as to prevent the possible introduction of dangerous substances from the outside.
11. A helmet according to claims 1 - 10 , wherein said main body (10) is made of shockproof plastic material.
12. A helmet according to claim 11, wherein said shockproof plastic material is chosen from the group comprising ABS, polycarbonate and mixtures of polycarbonate-based thermoplastic polymers.
13. A helmet according to claims 1 - 12, wherein said main body (10) comprises two lateral openings arranged close to the user's ears, and adapted to enable the user him/herself to clearly hear voices and noises from the environment;
14. A helmet according to claims 1 - 13, wherein said control system comprises a control module (20), based on a microprocessor and associated with appropriate power means (22) and with an interface module (21) adapted to enable the reading of data and the sending of commands from and to said at least one supplementary apparatus.

15. A helmet according to claim 14, wherein said at least one supplementary apparatus comprises a microphone (23) and a loudspeaker (24) in order to provide the user with remote audio communications, two keyboards (19, 19_bis), adapted to enable the user to give commands and select between the available functions, a GPS receiver (27), a RFID TAG sensor (28), a modem (29), for connection to the internet by means of the cellular data network, a Bluetooth transceiver (31) in order to control the devices equipped with a corresponding interface, a temperature sensor (30) and a gas sensor (32), a video camera (33) in order to shoot video footage of the surrounding environment which may possibly be saved or remotely retransmitted, a lighting module (34), comprising high intensity LEDs.

16. A helmet according to claims 1 - 15, comprising a plurality of pads, positioned on the internal wall of said main body (10) and having the functions of contributing to the ability of cushioning blows to said helmet, of rendering said helmet customizable so as to perfectly adapt to the measurements and shape of the user's head, and of facilitating the dissipation of the user's body heat.

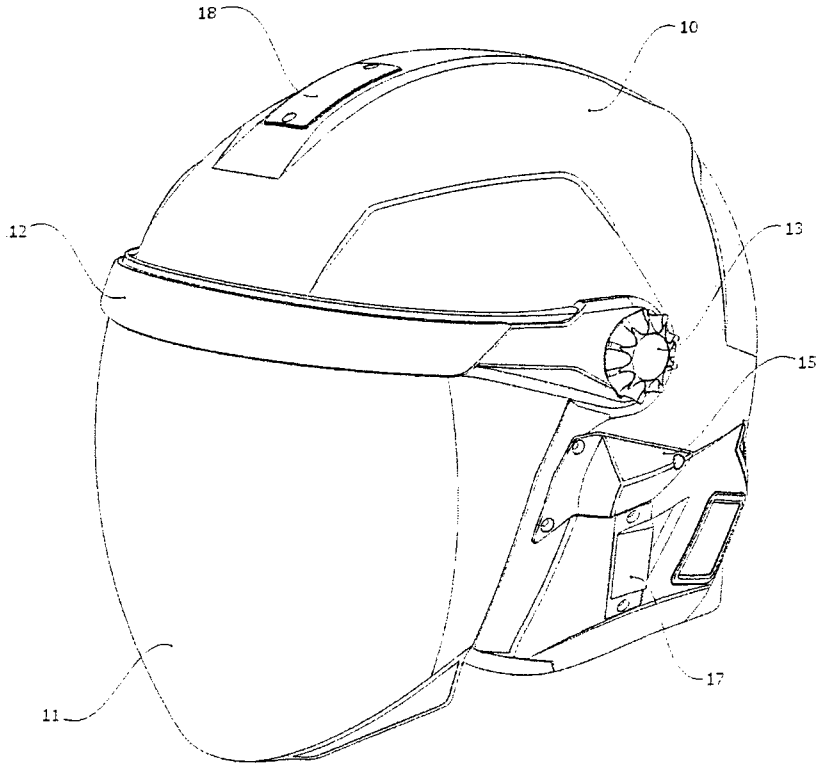

Fig. 1_a

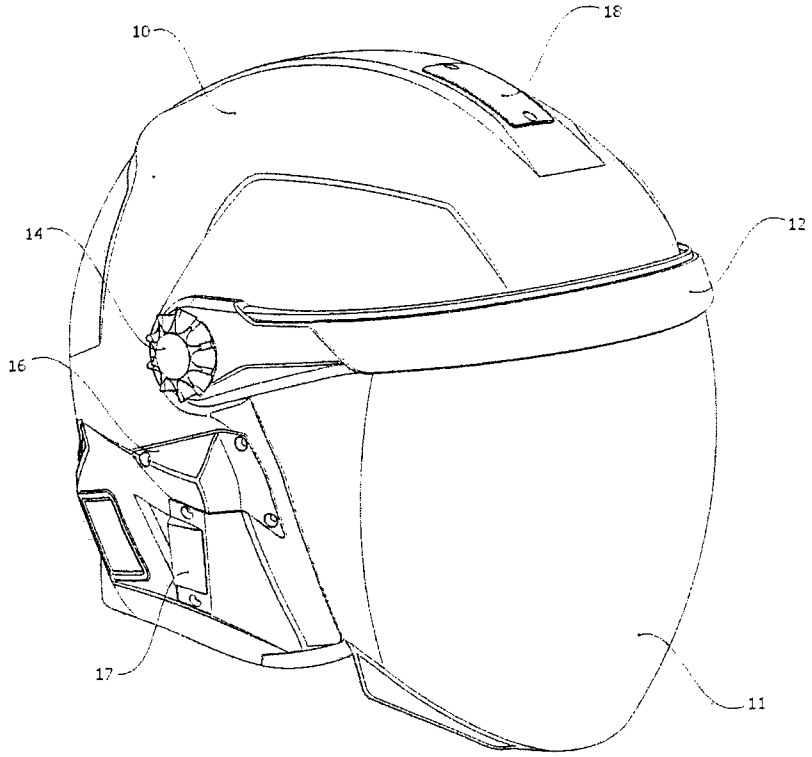

Fig. 1_b

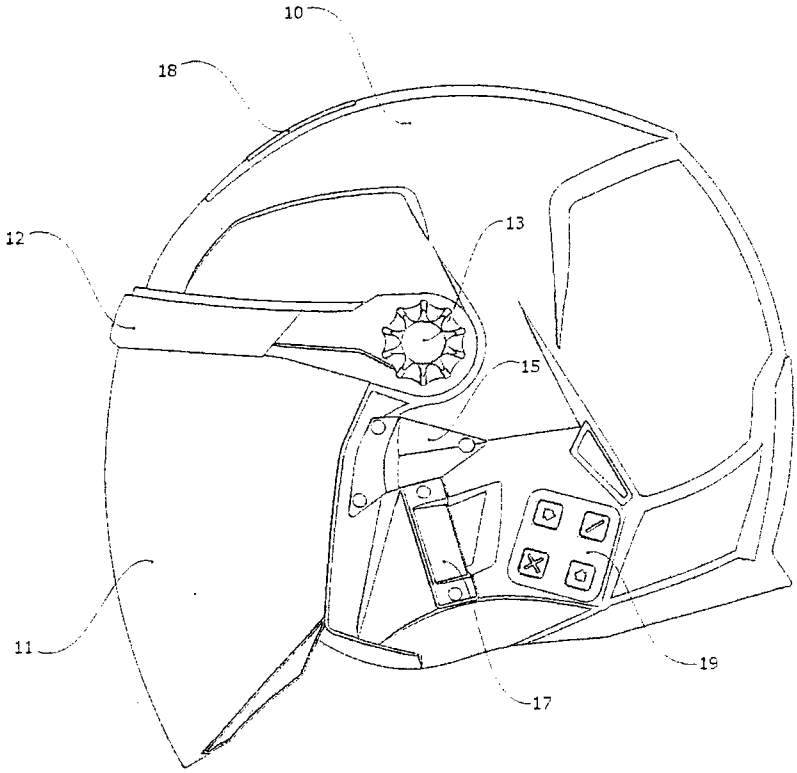

Fig. 2

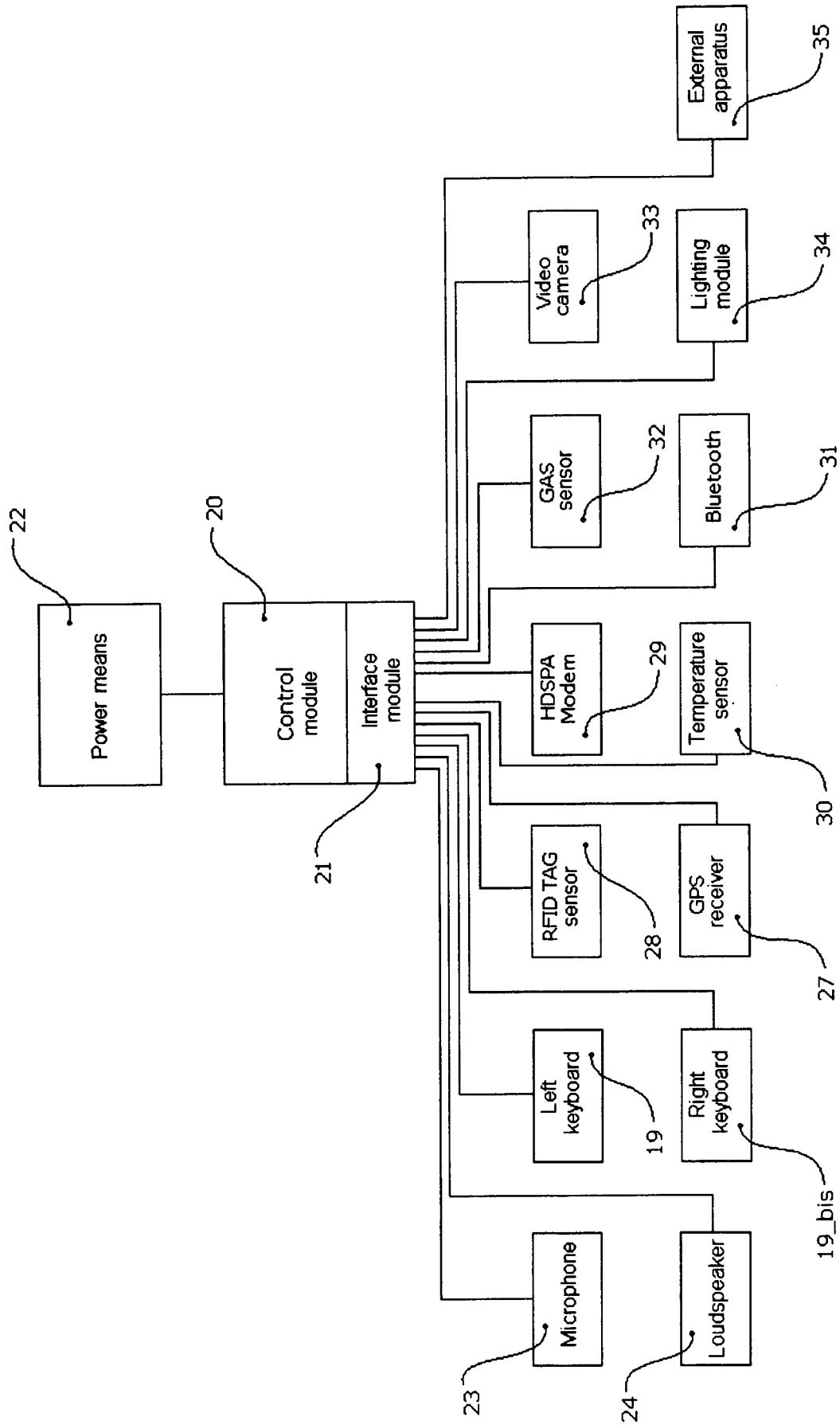
Power means
22
Control module
20
Interface module
21
External apparatus
35
Video camera
33
Lighting module
34
GAS sensor
32
Bluetooth
31
HDSPA Modem
29
Temperature sensor
30
RFID TAG sensor
28
GPS receiver
27
Left keyboard
19
Right keyboard
19_bis
Microphone
23
Loudspeaker
24

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2011/000350

A. CLASSIFICATION OF SUBJECT MATTER
INV. A42B3/30 A42B3/22 A42B3/04
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A42B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
3 July 2012	12/07/2012

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2011/000350

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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