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(54) **A SECURITY AND MONITORING DEVICE FOR SPORT ARTICLES, ELECTRONIC COMPUTER PROGRAM AND ASSOCIATED SPORT ARTICLE**

(57) Device (100) of monitoring and safety for sport articles, said device (100) being characterized in that it comprises a rigid body within which is contained a radio transmitting circuit (102), a data processing unit (103) electrically to said radio transmitting circuit (102) and an electric power source (105) configured for feeding at least

said radio transmitting circuit (102) and said data processing unit (103); said rigid body being suitable for being installed in substantial inclusion with a structure of a sport article (200; 300); said radio transmitting circuit (102) emitting a radio signal indicating a position of the sport article (200; 300) wherein said rigid body is inserted.

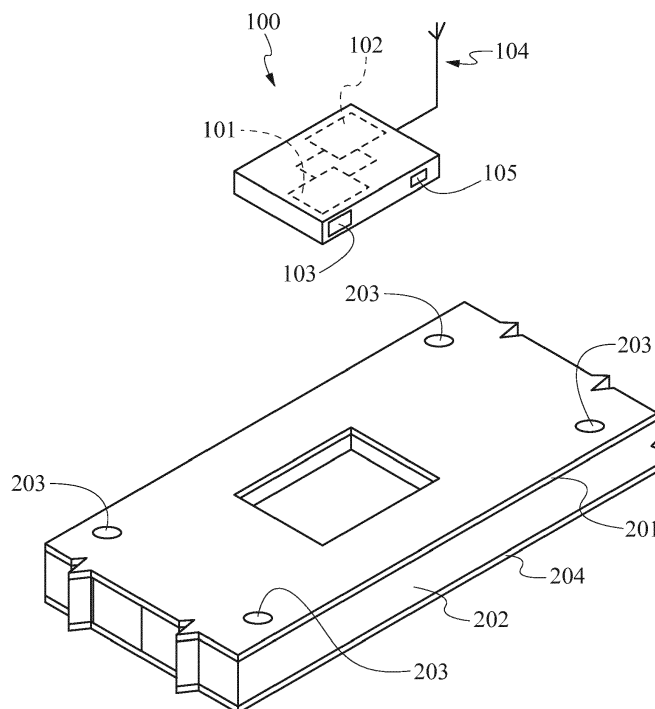


Fig. 1

Description

Field of the invention

[0001] The present invention refers to the field of safety systems, concerning in detail a monitoring and safety device for sport articles.

[0002] The present invention further concerns a ski provided with said monitoring and safety device.

[0003] The present invention further concerns a bicycle provided with said monitoring and safety device.

Background art

[0004] Some sport articles, in particular but in a non-limiting extent those having a combination of size and costs respectively low and high, are subject to thieves more than others.

[0005] In particular, the Applicant has observed that in Europe the theft of bicycles and skis is relatively high. For example, in Italy, FIAB shows that each year there are about 320000 bicycle thefts.

[0006] Bicycles recently have seen a sudden increase in technological evolution, and have reached prices that, as of 2015, can also exceed 6000 CHF. The bicycle, as of its nature, is an object which is light and confusable with others, and therefore its theft is relatively easy to perform, also when it is tied to a pole or anyway to a non-movable object by means of an anti-theft chain or equivalent device.

[0007] Skis, in turn, are produced in series and in standard sizes; ski theft, especially when the resort is crowded, is easy to perform and the ski which is theft is hardly identifiable in easiness.

[0008] The only way for verifying the ownership of a ski by a person, would be to verify the serial number. The applicant has anyway observed that not every ski has a visible serial number, and in any case an eventual control of the coupling between a serial number and an owner of a ski would impose a systematic control of any person that has the same type of ski. As a matter of fact, this renders the control impassable, excepting that the ski in of a particular type.

[0009] The applicant has observed that the theft of sport articles, in general, represents a cost for both the insurance companies and for the private citizens.

[0010] The Applicant has therefore conceived a monitoring and safety device for sport articles which allows for solving the aforementioned drawbacks.

Summary of the invention

[0011] According to the present invention is realized a monitoring and safety device for sport articles, said device being characterized in comprising a rigid body wherein is contained a radio transmitting circuit, a data processing unit electrically connected to said radio transmitting circuit and a source of electric power, configured

for feeding at least said radio transmitting circuit and said data processing unit; said rigid body being suitable for being installed in substantial inclusion into a structure of a sport article; said radio transmitting circuit emitting a radio signal indicating a position of the sport article wherein said rigid body is introduced.

[0012] For the purposes of the present invention, for monitoring shall be meant a periodic control of the motions of the sport article during its use, my means of a transmission of at least part of a collection of data stored by the device object of the present invention.

[0013] For the purposes of the present invention, with "safety" is meant a control of an anti-theft type wherein, from a remote position, the device object of the present invention can transmit positioning data of the sport article towards an user remotely positioned respective to the same.

[0014] In a preferred and non-limiting embodiment, said radio transmitting circuit is a mobile telephony stage susceptible of sending a message of georeferenced position of said device.

[0015] In a preferred and non-limiting embodiment, in alternative or association to the previous paragraph, said radio transmitting circuit transmits a radio signal on one or more predefined radio frequencies susceptible of being received at a short distance.

[0016] In a preferred and non-limiting embodiment, said circuit operates in association with a receiver of satellite positioning, contained into said rigid body and provided with an antenna outside said body.

[0017] In a preferred embodiment, said antenna is a patch antenna installed on a heel piece or upper surface of said ski.

[0018] In a preferred and alternative embodiment, said antenna is a patch antenna installed on a portion of a bicycle frame.

[0019] Preferably, said rigid body is waterproof and installed in a compartment of said ski, said compartment being positioned below a portion of a ski binding.

[0020] Advantageously, said device stores a plurality of motion and accelerometric data of said rigid body, and transmits them by means of said radio transmitting circuit; said transmission takes place upon request transmitted by a portable radio device towards said radio transmitting circuit, following which said data processing unit verifies a univocal code received from said radio portable device in association to said request.

[0021] In a preferred and non-limiting embodiment of the present invention, said device is configured for transmitting said radio signal at the moment of a measurement of acceleration and/or motion of said rigid body after the sending of a radio command of activation from an electronic portable device provided to said user.

[0022] In a preferred embodiment, said device comprises a memory area accessible after introduction of a security code, wherein are contained the data of said user; said data processing unit being configured for causing a transmission of a message of authorization to the

changing or association of said data of said user to a user portable electronic device of said sport article, and for allowing the change of said data of said user only at the moment of reception of a confirmation message of authorization to the changing of said data of said user by said authorized seller through its portable electronic device.

[0023] According to the present invention is realized a ski, provided with a body having a bottom, an upper plane and a couple of left and right side between the bottom and the upper plane, and wherein said ski is characterized by comprising a recess positioned in correspondence of the heel piece or toe piece of the binding, said recess being open on said upper plane and housing a monitoring and safety device for sport articles according to what has been previously described.

[0024] According to the present invention is further realized a bicycle frame, comprising a plurality of tubing welded one another and wherein therein supporting elements sustain a monitoring and safety device for sport articles according to what has been previously described.

[0025] According to the present invention is further realized a computer program, susceptible of being loaded and executed by an electronic device, and comprising software code portions conceived for:

- causing a sending of a activation message of a transmission of a radio signal indicating a position of the sport article, said radio signal, wherein said message is transmitted da said electronic device together with a data processing unit of a monitoring and safety device for sport articles provided with a receiver stage conceived per la reception of said activation message, wherein said device is installed within or at least partially within said sport article; and/or
- receiving a transmission of said positioning radio signal of said sport article within which said monitoring and safety device is installed, and causing the appearing on a display of said electronic device of an indication of position corresponding to the position of said sport article estimated on the base of said positioning radio signal;
- causing the transmission from said monitoring and safety device of sport articles towards said electronic device of an alert message in case said sport article is moved after the transmission of said activation message.

Description of the figures.

[0026] The invention will be hereinafter described with reference to a preferred and non-limiting embodiment, and with the support of the annexed figures wherein:

- figure 1 shows a perspective view of a ski using a monitoring and safety device of sport articles according to the present invention;
- figure 2 shows the monitoring and safety device of

sport articles according to the present invention, housed within the heel piece of the ski;

- figure 3 shows a section of a portion of a bicycle frame, wherein the monitoring and safety device of sport articles object of the present invention is installed;
- figure 4 shows the monitoring and safety device of sport articles object of the present invention, in association with an application for mobile telephony, in detail manageable through a mobile phone.

Detailed description of the invention

[0027] Referring to the annexed figures, and in detail to figure 1, with the reference number 100 is indicated in its complex a monitoring and safety device for sport articles.

[0028] In the course of the present description will be described applications of said monitoring and safety device in detail for sport articles like skis or bicycles without considering those application as being limitative.

[0029] The device 100 object of the present invention comprises a rigid body within which there are:

- at least a radio transmitting circuit 102, electrically connected with an antenna 104;
- an electric power source 104, providing electric power to the data processing unit 103 and to the radio transmitting circuit 102.

[0030] The electric power source is a long-lasting battery, conceived for feeding the electronic circuits as long as possible.

[0031] In a preferred embodiment, said battery is induction-rechargeable. This advantageously allows for not having to modify the position of the rigid body in the sport article.

[0032] The data processing unit 103 is electrically connected to the radio transmitting circuit 102 and with it exchanges data of activation and/or de-activation of a positioning radio signal that said radio transmitting circuit 102 sends through said antenna 104.

[0033] Preferably and in a non-limiting extent, said radio transmitting circuit 102 is coupled with a satellite signal receiver stage 101, which is in turn provided with an antenna that preferably can also be the same antenna 104. In case the satellite signal receiver stage 101 is present, the power source 104 will feed also said stage.

[0034] The satellite signal receiver stage 101 is conceived for allowing the reception of a georeferenced positioning signal of the rigid body of the device 100 object of the present invention, in such a way to guarantee that the sport article onto which is installed can be detected when the reception of the satellite signal is available. Said georeferenced positioning signal can be for example and in a non-limiting extent a GPS/GLONASS type signal.

[0035] In a first preferred a non-limiting embodiment, said radio transmitting circuit 102 is a mobile telephony

stage. This means that the antenna 104 is a radiotelephony antenna. The mobile telephony stage is configured for connecting with a conventional cellular telephonic network and for sending said positioning radio signal in the form of a text message with a predefined content.

[0036] In an alternative embodiment, said radio transmitting circuit 102 is a radio frequency circuit for short-distance communication. In said alternative embodiment, the radio frequency circuit can be associated with said mobile telephony stage.

[0037] The radiofrequency circuit for short-distance communication transmits said positioning radio signal preferably but in a non-limiting extent also in beacon mode, that is by means of a high frequency radio transmission that preferably contains a predefined message, like:

- a fixed identification code;
- a position signal obtained from said satellite signal receiver stage 101, or also a position signal of the mobile telephony cell.

[0038] Advantageously, the presence of both the circuits allows of having a greater security in finding the sport article onto which the device 100 object of the present invention is installed.

[0039] In fact, in that case the sport article can be found either by means of a simple receiver receiving an high frequency radio signal transmitted by the radio frequency circuit, or by means of a mobile phone to which said message is sent. Thus, in this case, the device 100 object of the present invention does not lose the operation even if the coverage of the cellular telephony is missing.

[0040] In a preferred and non-limiting embodiment, the data processing unit 103 is configured for keeping active the mobile telephony stage as primary circuit, and for using the radiofrequency circuit for short-distance communication as a secondary circuit, to be activated automatically when the mobile telephony coverage is not present. Said configuration of the data processing unit is typically preferable in case there is the satellite receiver stage 101, since through the message sent by the mobile telephony stage is easier to send a message of position also to remote users.

[0041] Alternatively, in a preferred and non-limiting embodiment, the device object of the present invention is configured in such a way the data processing unit 103 is configured for using the radio frequency circuit for short-distance communication as primary circuit, and for using the mobile telephony stage as secondary circuit. Said configuration is preferable when the satellite receiving stage 101 is missing. This renders the sport article primarily detectable at a short distance, and renders as well available the sending of the message from the mobile telephony stage, that even being capable of using the position of the cell, could be not so precise as it would be in case the satellite receiver stage is present.

[0042] Advantageously, further, said solution allows al-

so to reduce the overall power absorbed by the device, lengthening the times for the recharge of the supplying battery.

[0043] A shown in figure 1, in a first preferred and non-limiting embodiment, said rigid body is positioned in a recess of a ski, comprising an upper planar portion 200, a plurality of sides 202 interposed between said upper planar portion 200 and a bottom 201, a couple of left and right edges 204 and a plurality of holes 203 extending orthogonally with respect to said upper planar portion 200: said holes are conceived for housing an heel piece or a toe piece of a ski binding.

[0044] To the end of avoiding waggles, the recess which is recalled in the ski presents a same size of the rigid body; this last is preferably waterproof.

[0045] Advantageously, therefore, the recess that houses the rigid body is positioned below said ski binding in such a way that for accessing thereto an unmounting of at least part thereof is necessary, in the portion of the toe or heel piece. Therefore, this impedes to spiteful users to unmount the device 100 object of the present invention in an easy way, and furthermore allows of hiding the presence thereof. The user of the ski is not able to know if below the heel or toe piece there is said recess, unless that said toe or heel piece are removed.

[0046] In figure 2 is shown instead an alternative installation of the rigid body of the device 100 object of the present invention. The device 100 is introduced in a compartment of a heel piece 300 of the ski binding.

[0047] This advantageously allows of moving the heel piece from one ski to another without losing the device 100.

[0048] In figure 2 is furthermore shown the antenna 104 as being positioned in an extremity portion 301 of said heel piece 300. The antenna 104 shall be preferably capable of having a free aperture for the radio signal reception, and this is valid especially when the device 100 object of the present invention comprises the satellite receiver stage 101.

[0049] In any case the position of the antenna 104 on the extremity portion of the heel piece 300 shall not be intended as limitative.

[0050] Preferably, but in a non-limiting extent, the antenna 104 is a patch antenna. This advantageously allows it to be applied also on very small areas of a sport article, not necessarily planar.

[0051] The antenna 104 of a patch type is particularly convenient in the applications of mobile telephony, and can also be used for transmitting short-distance signals or for receiving global positioning satellite signals. Thus, said shape thereof results particularly convenient for all the receiving and transmitting circuits of the device object of the present invention.

[0052] As shown in figure 4, the device 100 object of the present invention can also be introduced in a recess of a bicycle frame 400, that in said figure is shown as having an oval shape section.

[0053] In case of installation on the frame 400, the de-

vice 100 object of the present invention is kept by supporting means welded or anyway hinged inside the tubing of the frame, and the rigid body is electrically connected through a cable of a known type with the antenna 104 that in this case protrudes upwards (arrow A) and is curved on the external surface of the bicycle frame.

[0054] This advantageously allows of not to reduce the aerodynamic of the bicycle keeping an optimal reception of the satellite signal.

[0055] The data processing unit 103 is configured for allowing the device 100 object of the present invention to dialogue with a portable electronic device of an user, to the end of allowing the transceiving of management and monitoring accessory data relating to the use of said sport article.

[0056] In detail, inside said rigid body of the device 100, there is a memory electrically connected with the data processing unit 103 within which are stored a plurality of data of use of the sport article onto which the device is installed.

[0057] Preferably, said data are accelerometric data from which known algorithms extract distances, speed, acceleration and paths traveled by said sport article. Exactly for this reason, the device 100 object of the present invention further comprises accelerometric sensor means in turn electrically connected with the data processing unit.

[0058] The data processing unit 103 stores said accelerometric data with a plurality of different ways.

[0059] In a first operative mode, the data processing unit 103 stores said accelerometric data only when from said portable electronic device is received a command of request of activation of the transmission of the positioning radio signal. In this configuration, therefore, the data processing unit 103 configures itself in such a way to operate as an anti-theft system transmitting the positioning radio signal only in case the sport article is moved.

[0060] Advantageously said accelerometric data are transmitted in combination to said positioning radio signal. So, it is not only possible to know what position is currently assumed by the sport article, but also what is the traveled path and which accelerations is subject to, thereby understanding if the object is moved since for example it is loaded on a vehicle or simply used by a non-authorized person.

[0061] In a second operative mode, the data processing unit 103 cyclically stores the accelerometric data, and transmits them in case by said electronic device is received a command of request of activation of a transmission of a plurality of historical accelerometric data. In this configuration, the data processing unit 103 is configured as a data collector suitable for render the user of the sport article aware on the operation and motion during its use, and not only in case of temporary abandonment.

[0062] The device 100 object of the present invention is furthermore advantageously configured for being operative also as a rescue device. In fact, the command of request of activation of the transmission of position signal

can also be received starting from an external electronic device provided to rescue bodies. Said electronic device, with respect to the user's one, has privileges of access to software portions and/or to the data processing unit which are higher than those of the data processing unit.

[0063] In this case, it is possible that the rescuers sends a command of request of transmission of the position signal towards the device 100 object of the present invention, that in this case becomes a real and actual passive searching device, intended as a device for being activated in case of need by a command transmitted from an external electronic device.

[0064] In addition, the device 100 object of the present invention can also be configured for activating autonomously the data processing unit when an acceleration exceeding a predetermined threshold value takes place. Said configuration is particularly helpful in case it is installed on a bicycle, since atypical accelerations are synonym of a fall.

[0065] On the electronic device provided to the user there is a software application loaded in the memory.

[0066] Preferably said electronic device is a mobile telephone of a smartphone type.

[0067] Said software application comprises code portions executed on the data processing unit of said electronic device and configured for allowing the same to:

- send a command of request of transmission of a positioning radio signal of the device 100 towards the antenna 104 of said device 100, so that its data processing unit 103 activates the radio transmitting circuit 102;
- receiving from said device 100 object of the present invention said radio signal and providing on a display 500 of the same at least one indication 504 of the position 505 of said sport article respective to said electronic device of the user;
- receiving from said device 100 object of the present invention a plurality of accelerometric data relating to said sport article;
- receiving from said device 100 a data relating to the sport article 502 that has been beforehand stored within the memory contained in said rigid body.

[0068] In a preferred embodiment, said software application is configured for causing the appearing on said display 500 of a map 504 of the position 505 of the sport article with respect to said user electronic device.

[0069] At the moment of the first configuration of the device object of the present invention it takes place what follows.

[0070] At first an authorized seller accesses to the memory of the device 100 by means of security code transmitted towards it in a known way. Subsequently, the authorized seller introduces into said memory the data of the sport article sport article and configures the software application which is installed on the device in such a way that it can interface with the device 100 by means

of sharing of its univocal number.

[0071] The data processing unit 103 is therefore configured for causing a transmission to the electronic portable device of the user of said sport article of a message of authorization to the changing or association of said data of said user after the authorization to the sharing from the authorized seller that, once the device 100 receives the univocal code of the software application installed on the user's electronic portable device, causes the association thereof. Through said procedure, the data of said user are modifiable only at the moment of reception of a confirmation message of authorization to the change of said data of said user by said authorized seller through its portable electronic device.

[0072] It is finally clear that to the object of the present invention can be applied additions, adaptations or variants being obvious for a skilled person without for this departing from the scope of protection provided by the annexed claims.

Claims

1. A monitoring and safety device (100) for sport articles, said device (100) being **characterized in that** it comprises a rigid body within which is contained a radio transmitting circuit (102), a data processing unit (103) electrically connected to said radio transmitting circuit (102) and a source of electric power (105) configured for feeding at least said radio transmitting circuit (102) and said data processing unit (103); said rigid body being suitable for being installed in substantial inclusion within a structure of a sport article (200; 300); said radio transmitting circuit (102) emitting a radio signal indicting a position of the sport article (200; 300) wherein said rigid body is introduced.
2. Device (100) of monitoring and safety for sport articles according to claim 1, **characterized in that** said radio transmitting circuit (102) is a mobile telephony stage susceptible of sending a message of georeferenced position of said device.
3. Device (100) of monitoring and safety for sport articles according to any one of the claims 1 or 2, **characterized in that** said radio transmitting circuit (102) transmits a radio signal on one or more predefined frequencies susceptible of being received at a short distance.
4. Device (100) of monitoring and safety for sport articles according to claim 3, **characterized in that** said radio transmitting circuit (102) operates in association with a satellite positioning signal receiver (101), contained within said rigid body, and provided with an antenna being external (104) to said rigid body.
5. Device (100) of monitoring and safety for sport articles according to claim 4, **characterized in that** said antenna (105) is a patch antenna installed on a heel piece (300) or upper surface (200) of a ski.
6. Device (100) of monitoring and safety for sport articles according to claim 4, **characterized in that** said antenna (104) is a patch antenna installed on a frame portion (400) of a bicycle.
7. Device (100) of monitoring and safety for sport articles according to any one of the preceding claims, **characterized in that** said rigid body is waterproof and installed within a compartment of a ski (200), said compartment being positioned below a portion of said ski binding.
8. Device (100) of monitoring and safety for sport articles according to any one of the preceding claims, **characterized by** comprising a memory storing a plurality of data of motion and acceleration of said rigid body, and **characterized in that** it transmits at least part of said accelerometric data by means of said radio transmitting circuit (102); said transmission takes place upon request transmitted by a radio portable device towards said radio transmitting circuit (102), following which said data processing unit (103) verifies a univocal code received from said radio portable device in association to said request.
9. Device (100) of monitoring and safety for sport articles according to any one of the preceding claims, **characterized by** being configured for transmitting said positioning radio signal at the moment of measurement of an acceleration and/or motion of said rigid body before the sending of a radio command of activation from a portable electronic device provided to said user.
10. Device (100) of monitoring and safety for sport articles according to any one of the preceding claims, **characterized in that** said memory comprises an area of memory accessible after introduction of a security code, wherein the data of said user are contained; said data processing unit (103) being configured for causing a transmission to a portable electronic device of the user of said sport article of a message of authorization to the change or association of said data of said user, and for allowing the change of said data of said user only at the reception of a confirmation message of authorization to the change of said data of said user by the authorized seller through its portable electronic device.
11. Device (100) of monitoring and safety for sport articles according to any one of the preceding claims when depending on claim 3 and on claim 2, **characterized in that** :

- said data processing unit (103) is configured for keeping active the mobile telephony stage as a primary circuit and for using said radiofrequency circuit for short-distance communication as a secondary circuit, activated once the covering of the mobile telephony identified by said mobile telephony stage is not present; or
 - said data processing unit (103) is configured for keeping said radio frequency circuit for short-distance communication as a primary circuit, and for using the mobile telephony stage as secondary circuit.

moved after the transmission of said activation message.

12. A ski (200), provided with a body having a bottom (201), an upper plane and a couple of left and right sides (204) between the bottom (201) and said upper plane, and wherein said ski is **characterized by** comprising a recess positioned in correspondence of the heel piece (300) or the toe piece of the binding, said recess being open on said upper plane and housing a device (100) of monitoring and safety for sport articles according to any one of the preceding claims 1-11.
13. Bicycle frame (400), comprising a plurality of tubing welded one another and wherein therein supporting elements sustain a device (100) of monitoring and safety for sport articles according to any one of the preceding claims 1-11.
14. A computer program, susceptible of being loaded and executed by an electronic device provided to a user of a sport article (200; 400), and comprising software code portions conceived for:
- causing a sending of a activation message of a transmission of a radio signal indicating a position of the sport article (200; 400), said radio signal, wherein said message is transmitted from said electronic device together with a data processing unit (103) of a device (100) of monitoring and safety for sport articles provided with a receiver stage (102) conceived at least for receiving said activation message, wherein said device (100) is installed within or at least partially within said sport article (200; 400); and/or
 - receiving a transmission of said positioning radio signal of said sport article (200; 400) within which said device (100) of monitoring and safety is installed, and causing the appearing on a display (500) of said electronic device of an indication (504) of position (505) corresponding to the position of said sport article estimated basing on said positioning radio signal;
 - causing the transmission from said device (100) of monitoring and safety of sport articles towards said electronic device of a alert message in case said sport article (200; 400) is

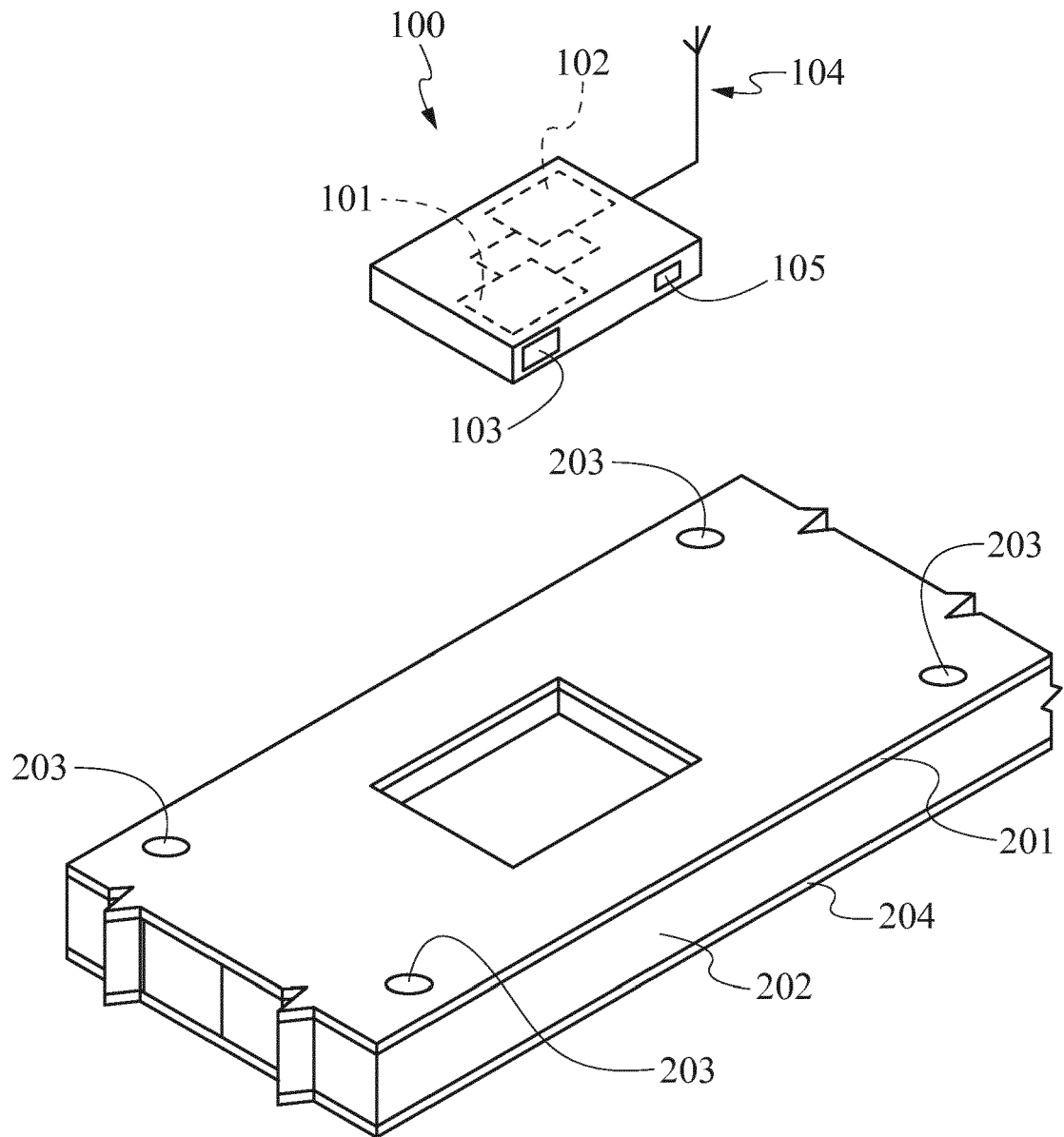


Fig. 1

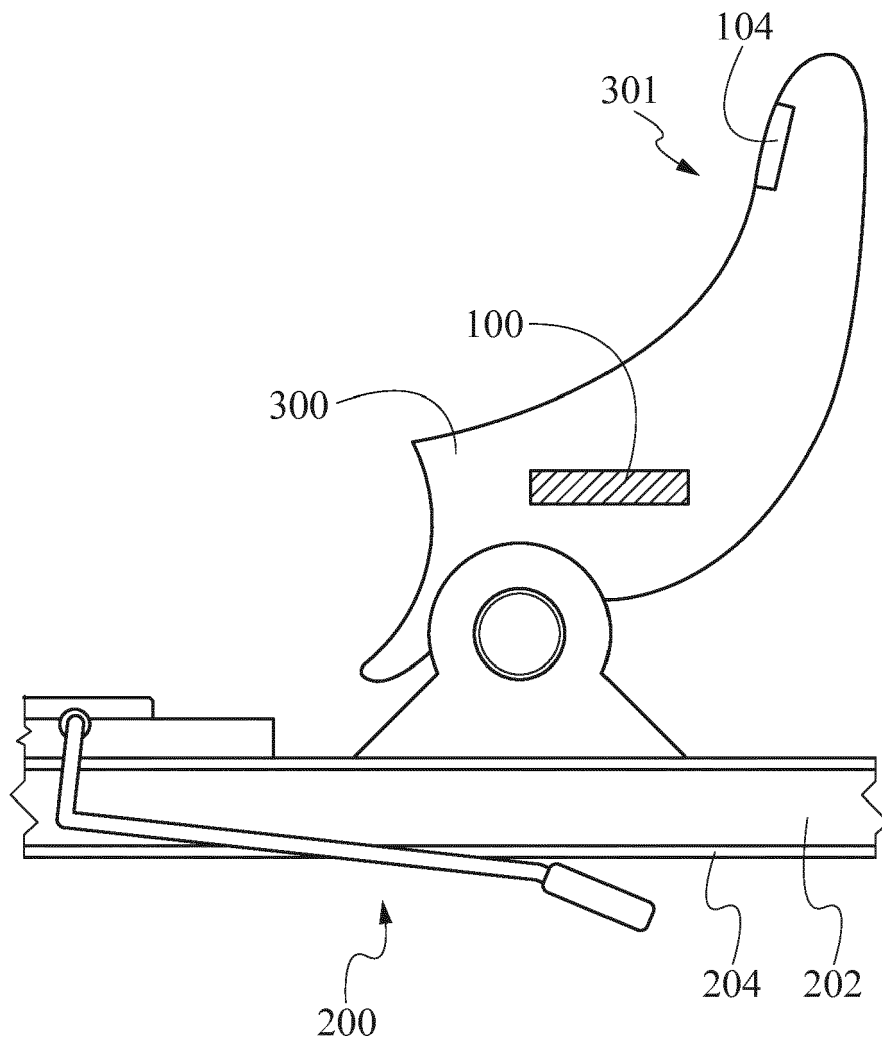


Fig. 2

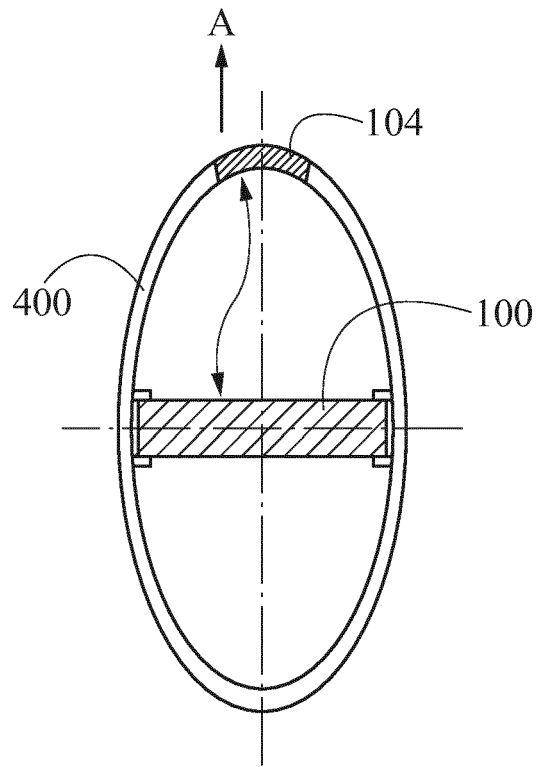


Fig. 3

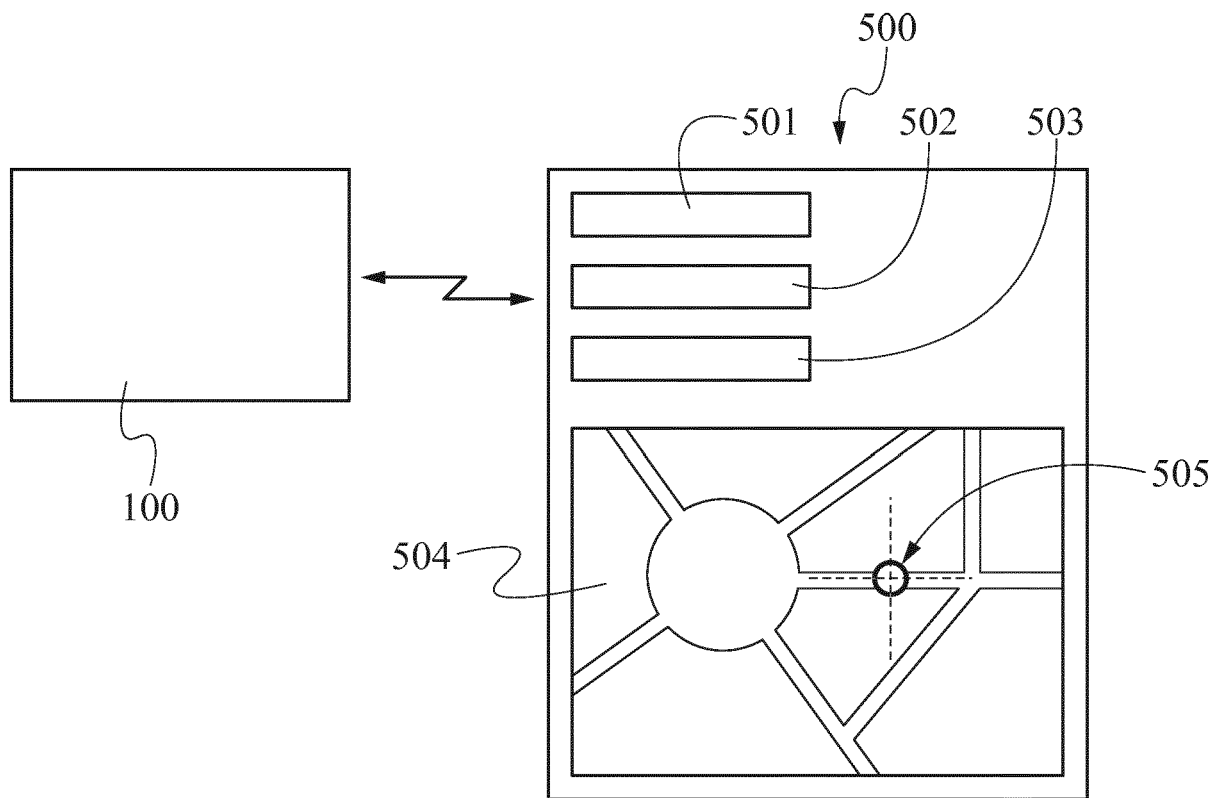


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 16 17 0999

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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Y	* abstract * * page 1, line 1 - page 7, line 32; figure 1 * * page 10 * * claim 1 *	5,6,8, 10,11	ADD. G08B25/01
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Place of search Munich		Date of completion of the search 10 November 2016	Examiner La Gioia, Cosimo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 16 17 0999

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82