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(71) Applicant: **Tirso S.r.l.**

20146 Milano (IT)

(72) Inventor: **Sparacino, Marco**

20146 Milano (IT)

(74) Representative: **Marietti, Andrea**

Marietti, Gislon e Trupiano S.r.l.

Via Larga, 16

20122 Milano (IT)

(54) **Data transmitting/receiving device joined to a wearable element and a method for its manufacturing**

(57) Device for data reception and/or transmission joined to a wearable element (1) in non-metallic material, essentially watertight, of the type that comprises at least one emitter and/or receiver device (4) for electromagnetic

and/or optical signals. The device is characterised in that the emitter and/or receiver device is inserted into a housing (2) created within said wearable element, said housing being sealed so that it is essentially watertight.

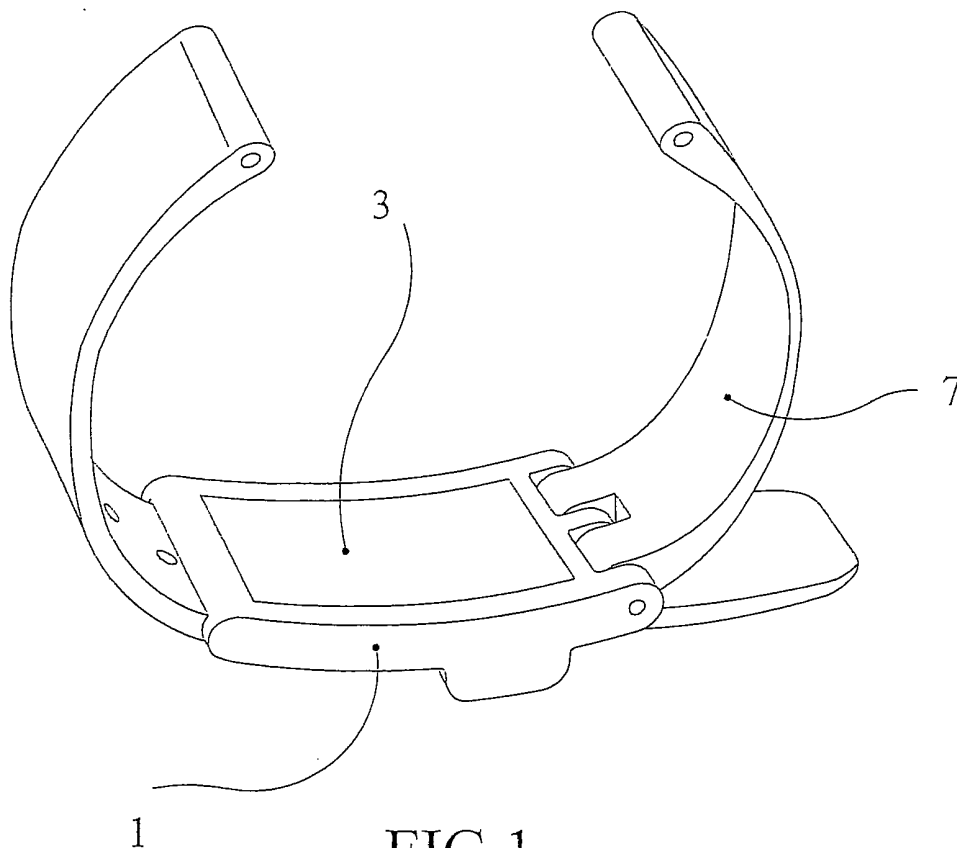


FIG.1

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Description

[0001] The present invention concerns a device for data reception/transmission, joined (or coupled) to a wearable element, of the type including an emitter/receiver device for electromagnetic or optic signals, and a method for integrating said emitter/receiver device into the wearable element.

[0002] It is known art to associate active or passive data reception and/or transmission devices to wearable elements that can be made out of any metallic or non-metallic material, such as for example wrist watches or garments with the purpose, for example, of detecting the position and/or identifying who is wearing the aforesaid wearable element.

[0003] The European patent application EP-A-0.125.143, in the name of MARC INDUSTRIES INC., describes a system to identify and detect a person's movements, in which a receiver/transmitter device is placed into a non-metallic bracelet that is worn by the person to be identified. The system described in the aforesaid application, which is particularly suited to use in a hospital or in large military or civil plants, does not consider the possible weatherproofing of the receiver/transmitter device placed inside the bracelet.

[0004] The United States patent US 4.916.679, in the name of AGNELLO, refers to a protective neoprene sheath for wristwatches, in which a microwave transponder can be fitted, to allow the person wearing said protective sheath to be located if necessary. Although the function of the sheath is also to protect the watch from the elements, the AGNELLO patent does not make any reference to the possible waterproofing of the transponder itself.

[0005] On the other hand, it is also prior art to create data transmitter/receiver devices by integrating (or fitting) an emitter/receiver device, such as for radio signals for example, into special recesses cut out of the metal casing that holds a watch dial. The emitter/receiver device for radio signals has an antenna placed outside the metal casing, the latter acting as a Faraday cage; the emitter/receiver device is protected from the elements by the metal casing itself, which can indeed easily be of the type that is essentially fluid-tight (i.e. impervious to fluids).

[0006] However, the difficulty of making the recess inside the metal casing and the need to place the antenna outside said casing make this realization particularly difficult, both in terms of its manufacturing technique and with regard to costs.

[0007] Furthermore, the metal casing could cause electromagnetic interferences that could disturb the functioning of the emitter/receiver device, making the transmission and/or reception device thus constructed inadequately efficient.

[0008] Therefore, on the one hand, integrating emitter/receiver devices into wearable elements in metallic materials allows these devices to be adequately weatherproofed, but is difficult and expensive to manufacture, as

well as being inadequately efficient; and on the other, fitting emitter/receiver devices into wearable elements in non-metallic materials is easy to carry out but does not guarantee that the emitter/receiver devices are adequately protected from the external environment, and from liquids in particular.

[0009] It is therefore a purpose of the present invention to provide a method for integrating an emitter/receiver device for electromagnetic and/or optic signals into a wearable element, such as a watch for example, that allows the aforesaid emitter/receiver device to be weatherproofed easily and without excessive costs.

[0010] A further purpose of the present invention is to create a data reception/transmission device, joined to a wearable element, in which at least one emitter/receiver device for electromagnetic and/or optic signals is protected from the weather elements, particularly from liquids, without that causing particular manufacturing difficulties.

[0011] These and other purposes are achieved by the method according to the first independent claim, and the subsequent claims which depend on it, and by the data reception and/or transmission device according to the eighth independent claim and the subsequent claims which depend on this later.

[0012] According to the present invention, the method for including at least one emitter and/or receiver device for electromagnetic and/or optic signals into a wearable element in non-metallic material which is essentially fluid-tight, includes the following stages:

- a. create a housing in the wearable element for the emitter and/or receiver device;
- b. insert the emitter and/or receiver device into the housing;
- c. seal, substantially creating a fluid-tight seal, the aforesaid housing.

[0013] In this way, it is the same material that the wearable element is made of which forms the housing, for an emitter and/or receiver device of the aforementioned type, which as a result is essentially sealed to be fluid-tight and is therefore able to protect said emitter and/or receiver from the weather elements.

[0014] Preferably, but not exclusively, the emitter and/or receiver is a transponder, of any suitable type that is on the market, and the wearable element is a buckle in plastic material.

[0015] The use of a buckle, such as the buckle of a watchstrap, within which the aforesaid housing can be created for a transponder or for another active or passive signal emitter and/or transmitter device, is particularly recommended; this is because both the size of the buckle and the material it is made of, which is usually harder than that used for bracelets or belts, allow the fluid-tight housing to be created more easily.

[0016] If the wearable element is made of plastic material, the method of the present invention can optionally include a stage of ultrasound welding with weld material,

in which one portion of the covering for the housing, made of the same plastic material as the housing, is welded using ultrasound to cover the housing.

[0017] According to another aspect of the present invention, a data reception and/or transmission device is provided joined with a wearable element, in non-metallic material, substantially fluid-tight, of the type including at least one emitter and/or receiver device for electromagnetic and/or optic signals, in which the emitter and/or receiver device is inserted into a housing that is formed in the wearable element. Said housing is sealed so that it is essentially fluid-tight.

[0018] Such a device can obviously be realized according to the aforementioned method.

[0019] There follows a description, purely by way of non-limitative example, of a preferred embodiment of the device according to the present invention, obtained through a particular form of execution of the method claimed herein, with the use of the annexed drawings in which:

- figure 1 is a perspective view of a buckle on a watchstrap, according to a particular aspect of the present invention;
- figure 2 is a perspective view of the buckle in figure 1, in which a housing can be seen that is formed out of it, for an emitter/receiver device; and
- figure 3 is a schematic side cross-section view of the buckle in figures 2 and 3, which contains within it an emitter/receiver device.

[0020] With reference to the drawings as a whole, the data reception and/or transmission device according to the present invention comprises an emitter and/or receiver device 4 for electromagnetic or optic signals, which is, in the particular embodiment illustrated herein, fitted within a plastic buckle 1 of a watchstrap 7 on a watch (not shown). The buckle 1 may be of any known kind, for example traditional or "deployant", as long as it is thick enough to allow an emitter and/or transmitter device 4 for electromagnetic or optic signals to be inserted in it, of a type known per se in prior art, and as long as it is made of impermeable plastic material.

[0021] Note that, although the following description refers to an emitter/ receiver device 4 being fitted into a buckle 1 in plastic material, the present invention is not limited to said wearable element, nor to the specific material of said element; instead it refers to any wearable element made in any non-metallic material which is substantially impervious to fluids such as, for example, even the watchstrap 7 shown here.

[0022] However, the use of a buckle 1 in impermeable plastic material, compared to the use of bracelets, watchstraps, belts, etc. in which an emitter/receiver device 4 could be integrated, is particularly advantageous; this is both due to the fact that the size, particularly the thickness, of buckles are usually greater than those of other wearable accessories, and due to the fact that the plastic

material that the buckles are made of is normally more impermeable, rigid and weatherproof than materials that can be used for watchstraps or bracelets.

[0023] Note that "buckle", here and below indicates not just any closure designed to close watchstraps, bracelets, belts or the like, but also a decorative detail or closure, preferably shaped with a double bracket, placed on wearable elements such as shoes, necklaces, bags, hats, key rings, etc.

[0024] According to the present invention, the buckle 1 comprises a housing 2 of a size sufficient to contain an emitter and/or receiver device for electromagnetic or optic signals, such as for example a transponder 4, and preferably also a battery 5 for it.

[0025] The housing 2 must be, according to the present invention, sealed in such a way to ensure that it is essentially sealed against fluids, and is liquid-proof in particular.

[0026] The use of the same non-metallic material, which is substantially impervious to fluids and was used for buckle 1, to protect the transponder 4 from the environment, thanks to inserting said transponder into the housing 2, allows the data reception and/or transmission device according to this invention to be easily manufactured.

[0027] Indeed, fitting (or integrating) the transponder 4 into non-metallic material, rather than fitting it into a metal casing, means that it is not necessary to place the antenna, or any other emitter/receiver, outside the metal housing, with the consequent difficulties of manufacture of the device; furthermore, the use of a impermeable non-metallic material, widely used in common clothing accessories or wearable items, to protect the transponder 4, means that said transponder 4 does not need to be waterproofed and protected beforehand.

[0028] According to a preferred aspect of the present invention, the housing 2 can be closed by placing an appropriate cover 3 being of dimensions, shape and materials suitable to guarantee the substantial fluid-tightness of said housing 2.

[0029] The cover 3 may advantageously be made of a sheet of the same material as the buckle 1, which could possibly be made at the same time as the housing 2 is made, and could then be ultrasound welded to buckle 1, where the housing 2 is, after the transponder 4 and battery 5 have been inserted into said housing. The ultrasound welding must preferably only concern the perimeter 6 of the cover 3, which is joined to the housing 2.

[0030] Alternatively, any known type of welding with weld material could be used to seal the housing 2 so that it is fluid-tight, or it could even be possible to use vulcanization processes, in the case of plastic material.

[0031] However, should ultrasound welding be carried out using a weld material 3 identical to the material of which buckle 1 is made of, excellent welding results can be achieved (thanks precisely to the ultrasound technique used) and it is also possible to avoid any unpleasant visual effects due to different materials being welded

together.

[0032] Furthermore, according to the present invention, in order to integrate at least one emitter and/or receiver device 4 for electromagnetic and/or optical signals, such as a transponder for example, into a wearable element in non-metallic material, which is substantially impervious to fluids, such as preferably a buckle 1, it is therefore advantageous to use the following method, which includes these stages:

- a. create a housing 2 for the emitter and/or receiver device 4 inside the wearable element 1;
- b. insert the emitter and/or receiver device 4 into said housing 2;
- c. seal, so that it is fluid-tight, the housing 2.

[0033] Preferably, as described above, the method allows for the fluid-tight sealing of the housing 2 to take place thanks to a welding operation using weld material, in which said weld material is advantageously the same material of which the wearable element 1 is made. If this is so, it is possible and advantageous to use an ultrasound welding system.

[0034] According to a preferred aspect of the method described above, furthermore, the waterproof material of which the wearable element 1 is made could be any plastic material, and preferably the wearable element could be, as already mentioned, a buckle, such as a buckle of a watchstrap.

Claims

1. Method for fitting at least one emitter and/or receiver device (4) for electromagnetic and/or optical signals into a wearable element (1) in non-metallic material which is substantially impervious to fluids, comprising the following stages:

- a. create a housing (2) for said at least one emitter and/or receiver device in said wearable element;
- b. insert said at least one emitter and/or receiver device into said housing;
- c. seal said housing so that it is substantially fluid-tight.

2. Method according to claim 1, wherein said wearable element in non-metallic material is to be chosen from either a strap, ring or buckle on a watch and/or bracelets, rings and buckles in general.

3. Method according to claim 1 or 2, wherein said at least one emitter and/or receiver device is a transponder.

4. Method according to any one of the previous claims, wherein said wearable element is made of plastic

material.

5. Method according to claim 4, wherein said stage of sealing said housing so that it is substantially impervious to fluids includes a stage of welding with weld material.

6. Method according to claim 5, wherein said weld material (3) is the same as that of said wearable element.

7. Method according to claims 5 or 6, wherein said welding stage involves ultrasound welding.

8. Device for data reception/transmission joined to a wearable element (1) in non-metallic material that is substantially impervious to fluids, of the type that comprises at least one emitter and/or receiver device (4) for electromagnetic and/or optical signals, **characterised in that** said at least one emitter and/or receiver device is inserted into a housing (2) created within said wearable element, said housing being sealed so that it is substantially fluid-tight.

9. Device according to claim 8, wherein said emitter and/or receiver device is a transponder.

10. Device according to claim 8 or 9, wherein said housing is sealed substantially fluid-tight through welding with weld material (3).

11. Device according to any one of claims 8 to 10, wherein said wearable element is made of plastic material.

12. Device according to any one of claims 8 to 11, wherein said wearable element is to be chosen from strap, ring or buckle of a watch and/or from bracelets, rings and buckles in general.

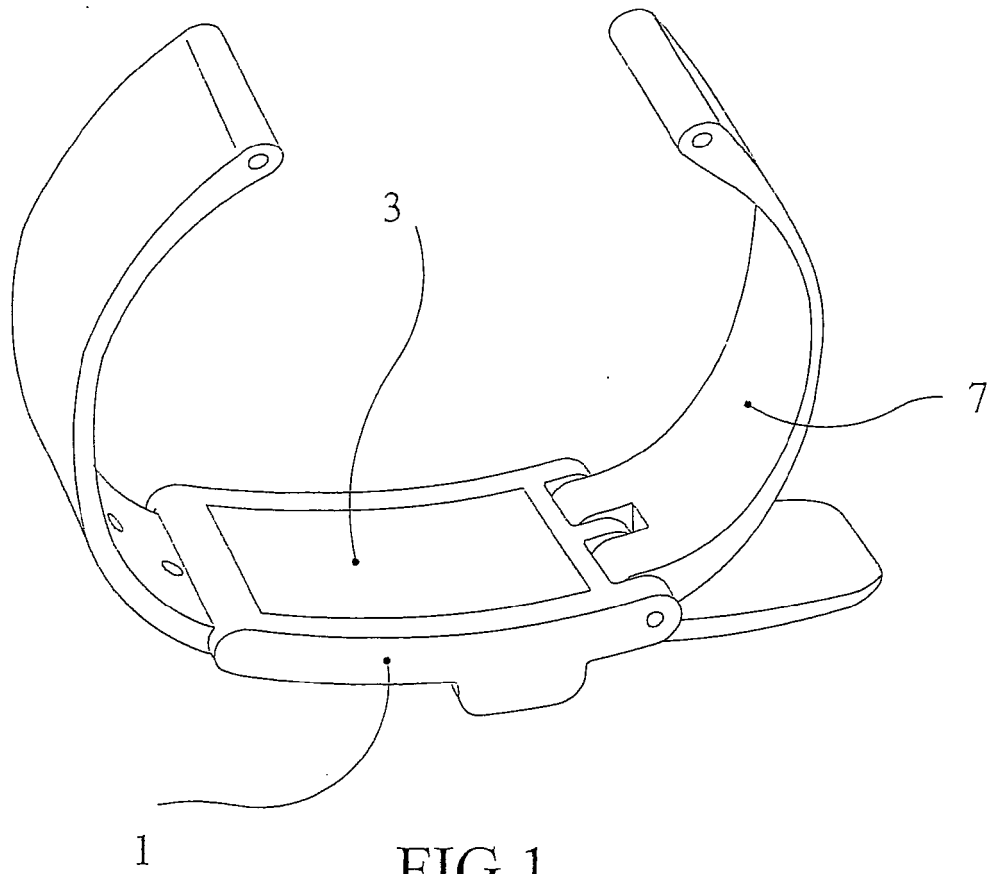


FIG.1

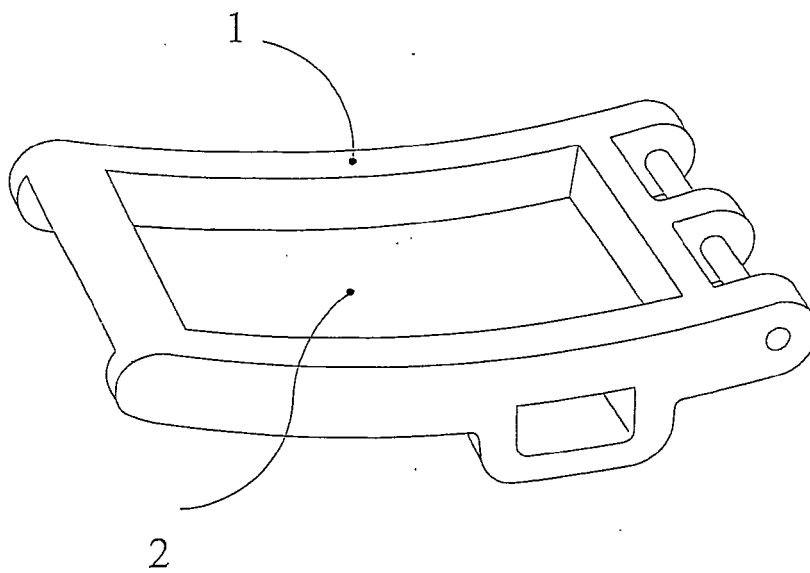


FIG.2

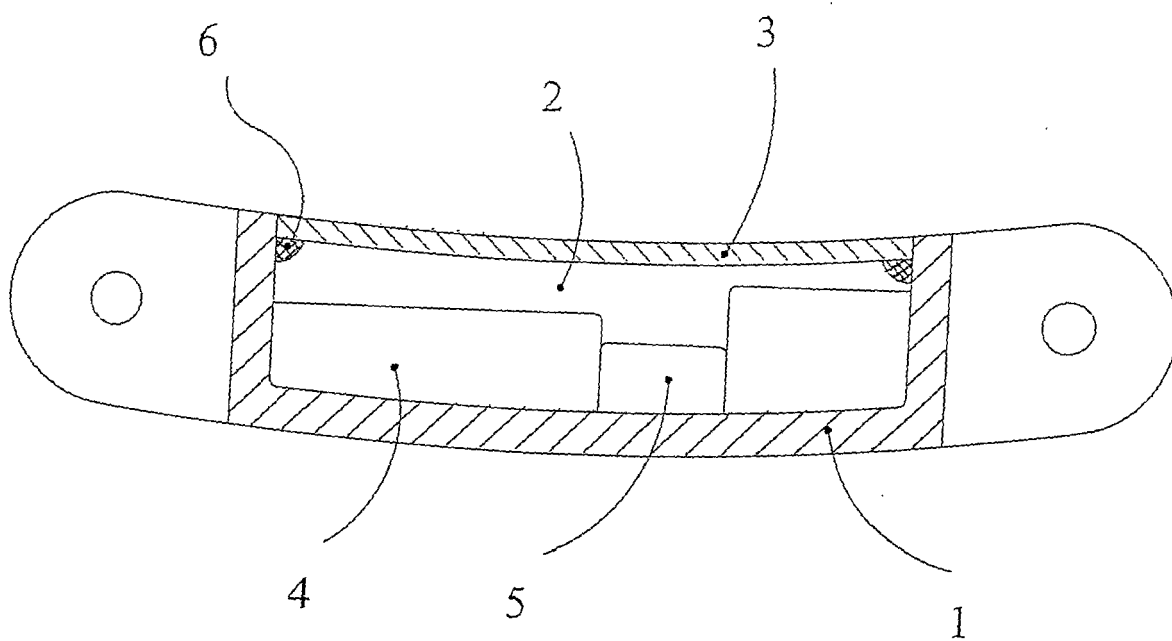


FIG.3



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EUROPEAN SEARCH REPORT

Application Number
EP 05 02 3741

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 05 02 3741

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