(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 155 607 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
29.03.2023 Bulletin 2023/13

(21) Application number: **22197228.4**

(22) Date of filing: **22.09.2022**

(51) International Patent Classification (IPC):
F21V 33/00 *(2006.01)* ***A44C 15/00*** *(2006.01)*
F21S 9/02 *(2006.01)* *F21W 121/06* *(2006.01)*
F21Y 115/10 *(2016.01)*

(52) Cooperative Patent Classification (CPC):
F21V 33/0004; A44C 15/0015; F21S 9/02;
F21W 2121/06; F21Y 2115/10

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **23.09.2021 IT 202100024522**

(71) Applicant: **Nicoli, Eliseo**
00015 Monterotondo (RM) (IT)

(72) Inventor: **Nicoli, Eliseo**
00015 Monterotondo (RM) (IT)

(74) Representative: **Cardelli, Guido**
c/o INGENIIS s.a.s. di B. Ciccarello e C.
Via Antonio De Berti, 24
00143 Roma (IT)

(54) WEARABLE LIGHT DEVICE

(57) A wearable light device has a support (1) and a lighting system (2). The support (1) comprises an elongated flexible modular element (10) having a first end equipped with a first housing (11) and with a first coupling member (12) integral with the first housing (11), and a second end equipped with a second housing (13) and a second coupling member (14) integral with the second housing (13), the elongated flexible modular element (10) extending along an axis x between said first end and said second end. The lighting system (2) has an electric power supply battery (3) located in at least one between the first housing (11) and the second housing (13), a LED (30, 31) provided in at least one of the two housings (11, 13), and a plurality of optical fibers (32) having ends (35, 36) facing the LEDs (30, 31).

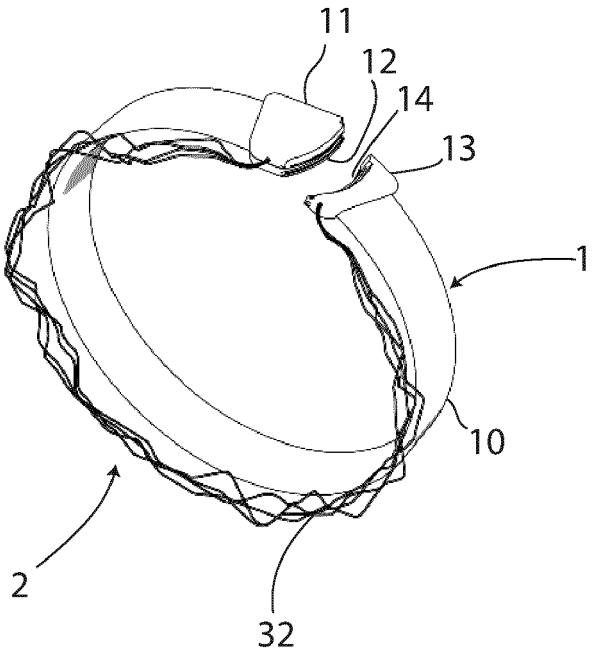


Fig. 3

EP 4 155 607 A1

Description

[0001] The present invention relates to a wearable light device.

[0002] US5366780 discloses an article decorated with light emitting diodes, hereinafter referred to as LEDs. The decoration is obtained with two lengths of sinusoidal stranded conductive wire, which feed, by means of two conductors connected to the wire and a battery, a plurality of LEDs. The decoration is applied on a female garment.

[0003] US6578981 discloses a bright pearl necklace for ornamental decoration. At least one LED, enclosed within one of the pearls, is powered by a conductor wire of a circuit contained within a pendant of the necklace. The thread also holds the pearls.

[0004] US20140347845A1 discloses a lighting system mounted on an article of clothing. An illuminating object, mounted on the article, is connected to a power supply and to a processing unit. The power supply can be a solar panel strip. The processing unit is capable of analyzing the rhythm of the music and controlling the lighting of the illuminating object. The illuminating object can include a network of illuminating wires, placed along the outline or the seams of the clothing, so that it gives the clothing an outer frame that is glowing or flashing in the dark. The lighting source can be made of electroluminescent wires, neon soft glows, LEDs and optical fibers. In some embodiments, the skeleton frame is made of LED light sources couple with optical fibers. When the LED lights turn on, the light passes along the optical fiber to give a soft glow effect of neon light. US20140347845A1 does not describe how the frame can be joined to the article of clothing in a simple and effective way. In addition, the lighting system is an integral part of the clothing item and cannot be separated from it.

[0005] US2004/0136205A1 discloses a luminous collar and a luminous lead, having a flexible tubule covered with multiple plastic optical fibers, held at their ends by a clamping head. At the ends of the collar and the lead is a box containing an LED facing the ends of the optical fibers and a battery holder with battery. The optical fibers wrap on external surface of the flexible tubule without the possibility of detaching. Furthermore, the optical fibers have ends supported by the box containing the LED parallel to the flexible tube.

[0006] US 4652981 discloses an illuminable belt consisting of a non-opaque tube, having at its ends two pieces forming a buckle, a battery, a switch and a light bulb. Inside the tube, a multiplicity of optical fibers has ends facing the light bulb. The optical fibers cannot exit from the inside of the elongated tube. Furthermore, the ends of the optical fibers are supported by the two pieces of buckle parallel to the flexible tube.

[0007] The present invention aims to overcome the drawbacks present in the findings described by the last two documents cited, in particular the fact that the multiplicity of optical fibers cannot extend away from the tube which supports or contains them.

[0008] The general purpose of the present invention is to provide a support for light sources to constitute a wearable light device.

[0009] Another object of the present invention is to allow the light sources to be free in their arrangement with respect to the support, and to have a support point outside the support itself, on the person wearing the light device or on parts of his clothing.

[0010] To achieve the aforementioned objects, the present invention, as defined in claim 1 annexed to the present description, provides a wearable light device having a support and a lighting system with an on-off switch. The support is an elongated flexible modular element having a first end equipped with a first housing and a first coupling member integral with it, and a second end equipped with a second housing and a second coupling member integral with it. The flexible elongated modular element extends along an x axis between the first end and the second end. The first and second coupling members are capable of joining both with each other and with other coupling members of another flexible elongated modular element. The lighting system has an electric power supply battery located in at least one between the first and second housing, an LED in at least one of the two housings, and a plurality of optical fibers having ends that face the LEDs and are supported by the two housing. Each LED is configured for emitting a beam of light in a y direction forming an angle other than 0 degrees with the x axis of the elongated flexible modular element.

[0011] Advantageously, the angle formed between the x axis of the elongated flexible modular element and the y direction of the LED light beam is 90 degrees. According to the invention it is possible to join several elongated modular elements so that the light device can be worn around various parts of the body.

[0012] Furthermore, the plurality of optical fibers is able to extend away from the flexible elongated modular element. As will be seen better below, the optical fibers can have at least one support in addition to the support of their ends connected to the first housing and the second housing. This further support can be an attachment element distinct from the flexible elongated modular element, for example a means for retaining the optical fibers which, in turn, is joined to a part of the body of the wearer of the light device, for example an elastic ring.

[0013] The luminous device according to the present invention has aesthetic purposes for the wearer, for example in dance halls and discos, but can have recognition and visibility functions in various situations.

[0014] Further characteristics and advantages of the invention will become most clear from the description of embodiments of the wearable light device, illustrated by way of non-limiting example in the accompanying drawings in which:

- Figure 1 is a top plan view of a first embodiment of a wearable light device according to the present invention;

Figure 2 is a perspective view of the wearable light device in Figure 1;
Figure 3 is a perspective view of the wearable light device in Figure 2 curved like a bracelet, before being fastened;
Figure 4 is a left end view of the wearable light device in Figure 1;
Figure 5 is a right-hand end view of the wearable light device in Figure 1;
Figure 6 is an enlarged partial perspective view of a coupling part of the wearable light device in Figure 3 in the locked position;
Figure 7 is a perspective view of a portion of a mannequin wearing as a choker the light device according to the first embodiment of the present invention;
Figure 8 and Figure 9 are two perspective views of the wearable light device in Figure 3, used as a bracelet in a second embodiment of the present invention;
Figure 10 is a perspective view of the wearable light device, applied to a shoe according to a third embodiment of the present invention; and

- Figure 11 and Figure 12 are front and rear perspective views of a portion of a mannequin wearing several light devices at the waist according to the first embodiment of the invention, joined together.

[0015] Reference is initially made to figures 1 to 6 which represent a first embodiment of the wearable light device according to the present invention in a top plan view, in a straight perspective view and, respectively, curved as a bracelet, in a top view left and right extremities, and finally in an enlarged partial perspective view of a part thereof in the locking position.

[0016] The wearable light device according to the invention has a support 1 and a lighting system, generally indicated as 2.

[0017] The support 1 according to the invention comprises an elongated flexible modular element 10 having a first end equipped with a first housing 11 and with a first coupling member 12, integral with it, and a second end equipped with a second housing 13 and with a second coupling member 14, integral with it.

[0018] Referring in particular to Figure 6, according to the invention, the lighting system 2 has an electric power supply battery 3, two LEDs 30, 31, a plurality of optical fibers 32 and an on-off switch (not shown in the drawings). The battery may suitably be a so-called button battery. The LEDs 30, 31 are preferably of the RGB type. The LED 30 is in the first housing 11, while the LED 31 is in the second housing 13. The housings 11 and 13 are illustrated in figure 6 without their parts to show the inside. The LED 30 is fed by the battery 3 with the electrical connections 33, while the LED 31 is fed by a wire 34 running along the flexible elongated modular element 10. The power cable 34 connects the LED 31 contained in the second housing 13 to the power supply battery 3.

[0019] The plurality of optical fibers 32 has ends, indicated generically as 35, 36 which are respectively facing the LEDs 30, 31 and supported by the two housings 11, 13. As an alternative to the power supply cable 34, the LED 31 could be powered by one of its batteries housed in the second slot 13. In this case, the housing should have dimensions similar to those of the first slot 11. As shown in the figures, the optical fibers 32 run parallel to the flexible elongated modular element 10; even if not shown, they can be supported by it not only in the first and second housings 11, 13, but also in other points. The first coupling member 12 and the second coupling member 14 are of the male-female type.

[0020] When the switch is turned on, the LEDs 30, 31 simultaneously emit lights in the optical fibers 32, creating light effects in them.

[0021] As can be seen in Figures 2 to 5, the first coupling member 12 and the second coupling member 14, which are the coupling part of the wearable light device according to the present invention, are able to join together by means of, for example, a male-female coupling. For example, the first coupling member 12 has a linear cavity, with undercuts, and the second coupling member 14 has a prismatic projection, for example a dovetail, adapted to engage with the linear cavity, both the prismatic projection and the linear cavity being able to create a linear joint. It should be clear that any type of attachment could be used for the ring closure of the flexible elongated modular element 10. Figure 7 shows a perspective view of a portion of a mannequin wearing the light device according to the first embodiment of the present invention as a choker. The locking position is obtained by sliding the projection of the coupling member 14 into the cavity of the coupling member 12.

[0022] Figures 8 and 9 show two perspective views of the wearable light device of Figure 3, used as a bracelet in a second embodiment of the present invention. In this embodiment, the flexible elongated modular element 10 is wrapped twice around the wrist of the wearer of the light device and then the coupling members 12, 14 are joined together.

[0023] The wearable light device according to this embodiment illustrated in figures 8 and 9 has the plurality of optical fibers 32 supported, as well as by the first and second housing 11, 13, in a separate point from the elongated flexible modular element 10.

[0024] In fact, the optical fibers 32 are supported by an attachment element 37 to be worn. The attachment element 37 could be, for example, a rubber ring that can be inserted in the index finger that allows you to connect the plurality of optical fibers 32 away from the elongated flexible modular element 10. The present invention also describes a use of the wearable light device in which the plurality of optical fibers 32 has ends 35, 36 supported by the two housings 11, 13 and is held in at least one point of the plurality of optical fibers 32, comprised between their ends. 35, 36, on a part of the clothing of the

person wearing the light device.

[0025] Figure 10 shows a perspective view of a third embodiment of the wearable light device according to the present invention, applied to a shoe. The third embodiment is similar to the second. As in the second embodiment of Figures 8 and 9, the flexible elongated modular element 10 is wrapped twice around the limb of the wearer of the light device, but instead of using an additional attachment element, the optical fibers 32 are attached to a shoe lace.

[0026] Figures 11 and 12 show front and rear perspective views of a portion of a mannequin wearing several light devices at the waist according to the first embodiment of the invention, joined together. In fact, the first and second coupling members 12, 14 of the elongated flexible modular element 10 are able to join, as well as with each other, also with conjugated coupling members of another elongated flexible modular element 10.

Claims

1. Wearable light device having a support (1) and a lighting system (2) which comprises an electric power supply battery (3), at least one light emitting diode or LED (30, 31), a plurality of optical fibers (32) and an on-off switch, wherein:

- the support (1) comprises an elongated flexible modular element (10) having a first end equipped with a first housing (11) and with a first coupling member (12) integral with the first housing (11), and a second end equipped with a second housing (13) and a second coupling member (14) integral with the second housing (13), the elongated flexible modular element (10) extending along an axis x between said first end and said second end, and the first coupling member and the second coupling member (12, 14) being able to join both with each other and with other coupling members (14, 12) of another flexible elongated modular element (10); and
- the lighting system (2) has:

  the electric power supply battery (3) located in at least one between the first housing (11) and the second housing (13),
  the LED (30, 31) provided in at least one of the two housings (11, 13), and
  the plurality of optical fibers (32) having ends (35, 36) that face the LEDs (30, 31) and are supported by the two housing (11, 13);

characterized in that the LED (30, 31) is configured for emitting a light beam in a y direction forming an angle different from 0 degrees with the x axis of the elongated flexible modular element (10).

2. Wearable light device according to claim 1, wherein the angle formed between the y direction of the light beam of the LED (30, 31) and the x axis of the elongated flexible modular element (10) is 90 degrees.

3. Wearable light device according to claim 1, wherein a single electric power supply battery (3) is located in the first housing (11) and is able to feed the LED (30) contained therein, and a power cable (34), extending along the flexible elongated modular element (10), is adapted to connect the LED (31) contained in the second housing (13) to the power supply battery (3) in order to feed the LED (31) contained therein.

4. Wearable light device according to claim 1, wherein an electric power battery is located both in the first housing (11) and in the second housing (13) and is able to feed the LED contained therein.

5. Wearable light device according to claim 1, wherein the first coupling member (12) and the second coupling member (14) are of a male-female type.

6. Wearable light device according to claim 5, wherein the first coupling member (12) has a linear cavity and the second coupling member (14) has a prismatic protrusion able to engage the linear cavity, both the linear cavity and the prismatic protrusion being configured to create a linear joint.

7. Wearable light device according to claim 1, wherein the plurality of optical fibers (32) is supported, in addition to the first housing (11) and the second housing (13), by a connecting member separated from the flexible elongated modular element (10).

8. Wearable light device according to claim 7, wherein said connecting member is a ring (37) to wear on a finger.

9. Use of the wearable light device according to claim 1, wherein the plurality of optical fibers (32) has optical fiber ends (35, 36) supported by the first housing (11) and the second housing (13) and is retained in at least a point of the plurality of optical fibers (32) that is within said optical fiber ends (35, 36) by a part of clothing of the person wearing the light device.

10. Wearable light device according to claim 8, wherein said part of clothing is a shoe lace.

Fig. 1

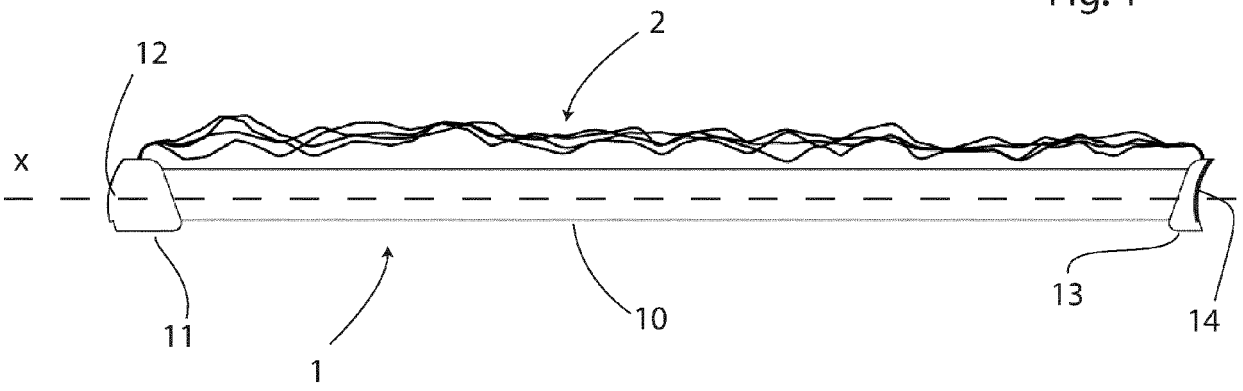


Fig. 3

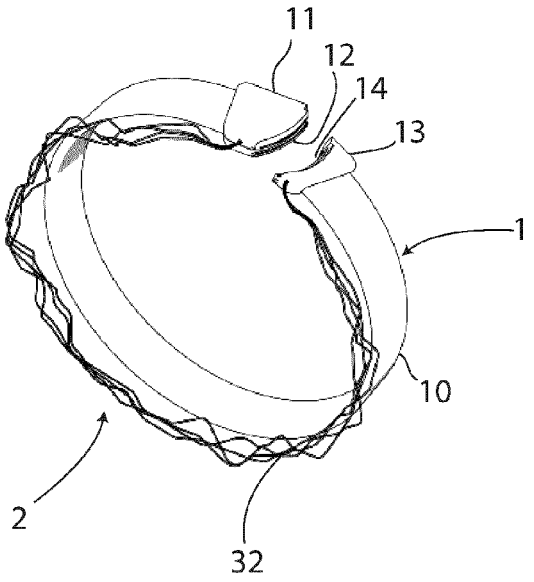


Fig. 2

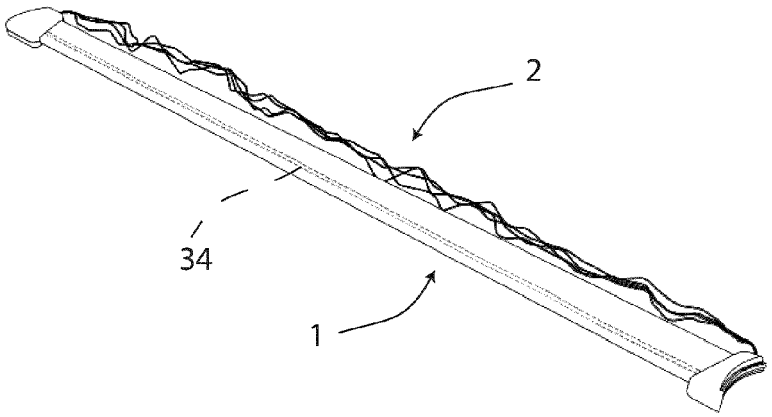


Fig. 4

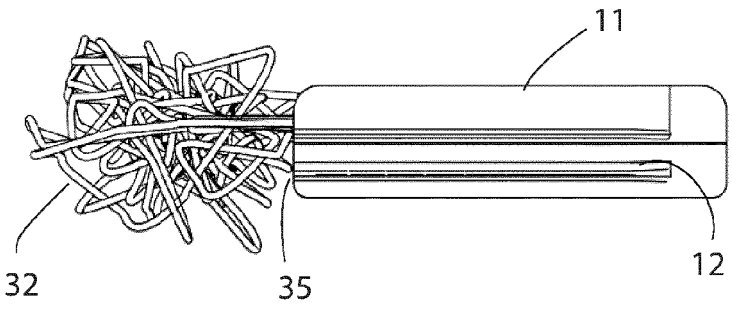
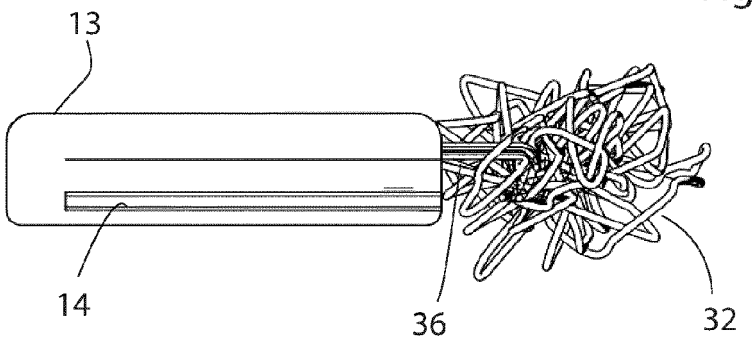


Fig. 5



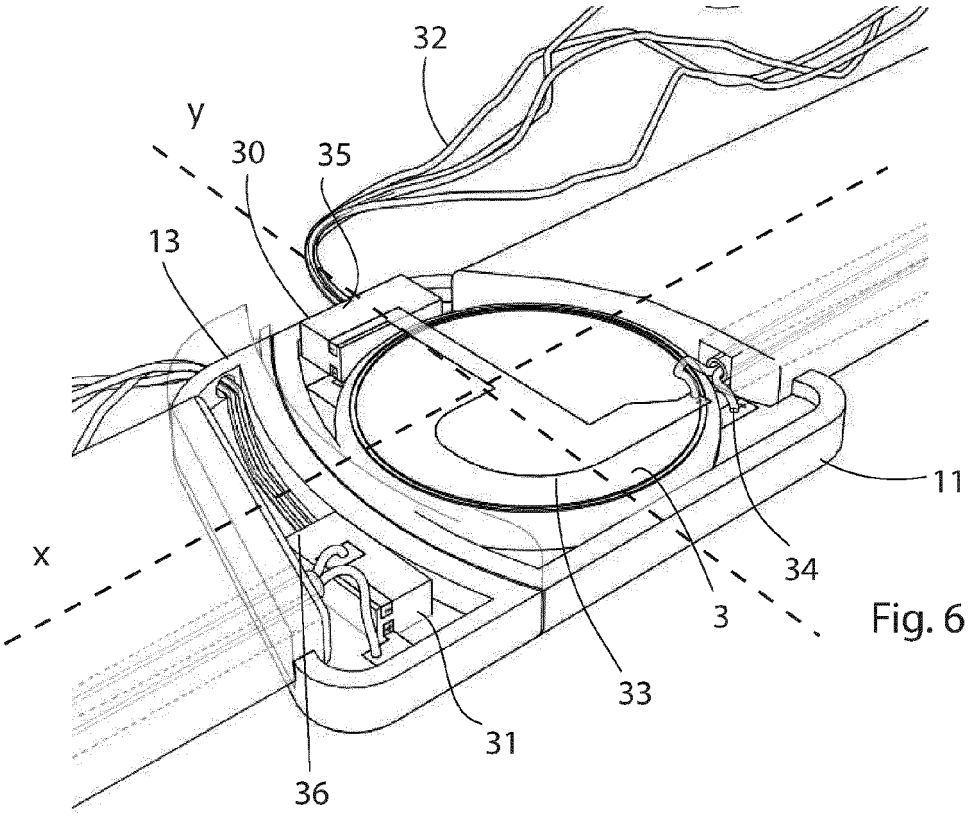


Fig. 6

Fig. 7

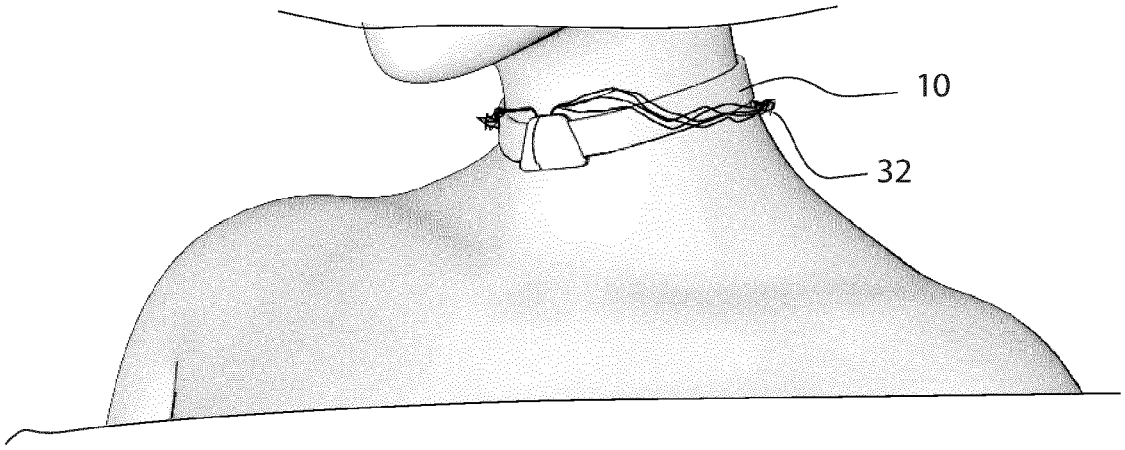


Fig. 8

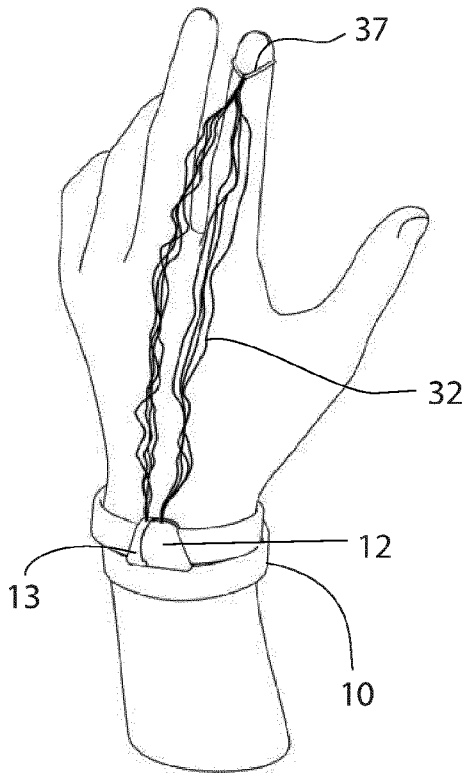
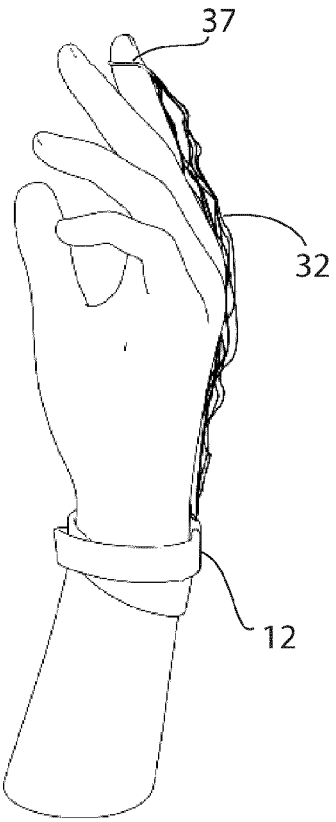


Fig. 9



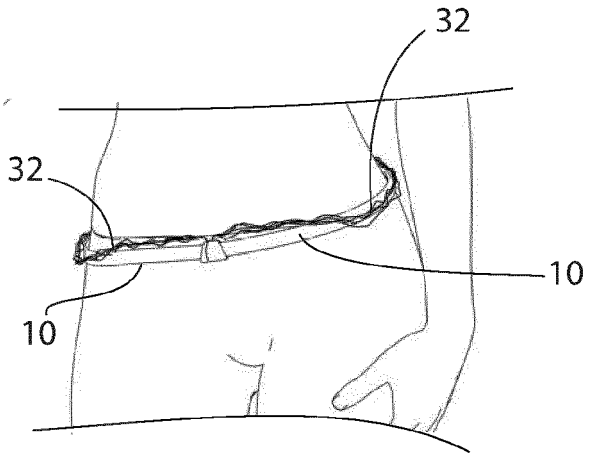


Fig. 11

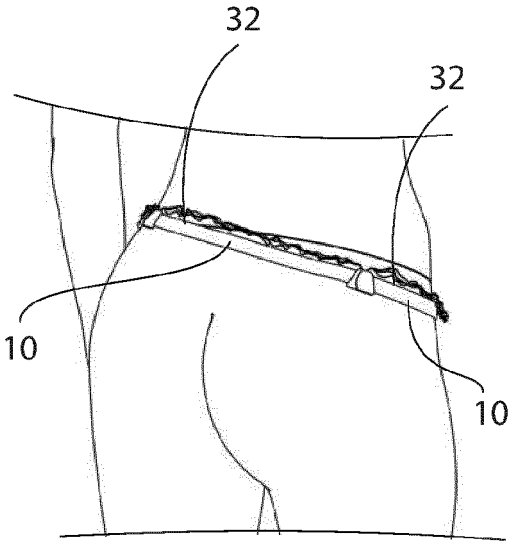


Fig. 12

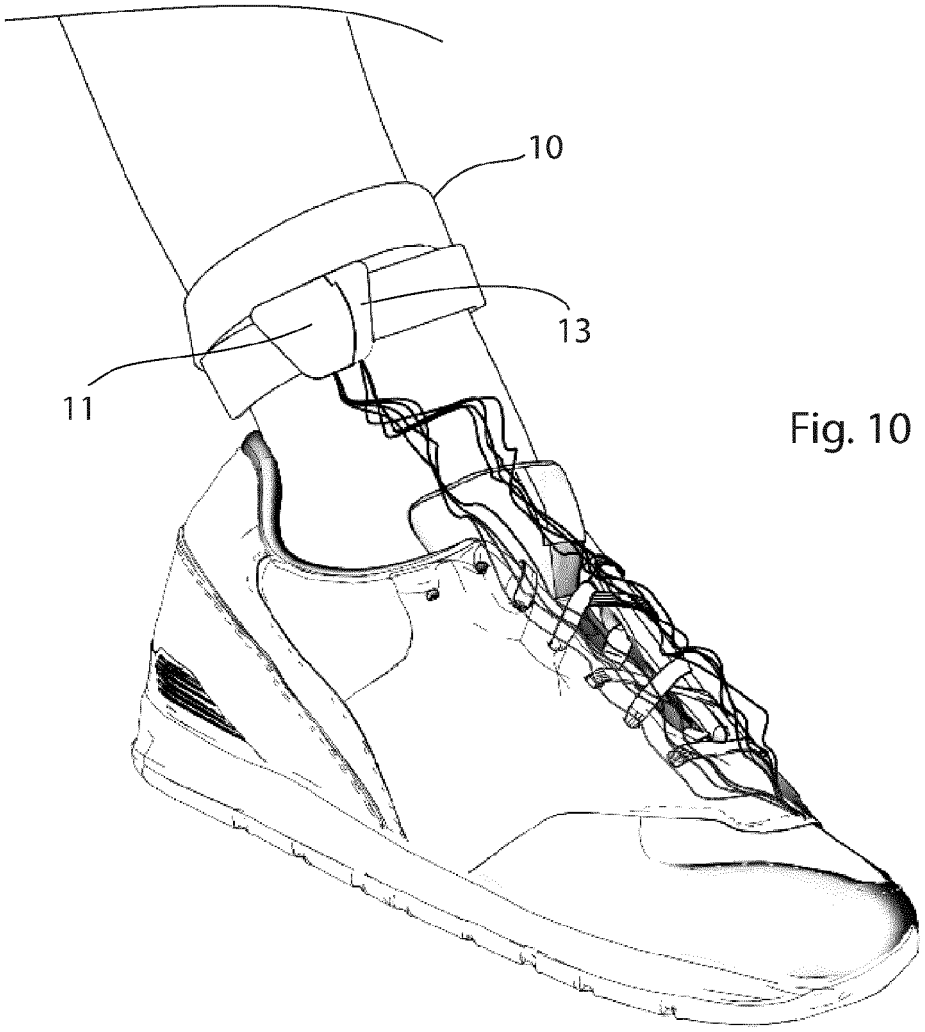


Fig. 10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 19 7228

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2004/136205 A1 (PENG CHI-TSUNG [TW] ET AL) 15 July 2004 (2004-07-15) * paragraph [0017] - paragraph [0021] * * figures 1-3 *	1-10	INV. F21V33/00 A44C15/00 F21S9/02
A	US 4 652 981 A (GLYNN KENNETH P [US]) 24 March 1987 (1987-03-24) * column 2, line 36 - column 3, line 49 * * figures 1-6 *	1-10	ADD. F21W121/06 F21Y115/10
A	US 4 186 425 A (NADIMI AHMAD [US]) 29 January 1980 (1980-01-29) * column 1 - column 2 * * figures 1,2 *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

F21V
A44C
F21W
F21Y
F21S

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 December 2022	Demirel, Mehmet

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 ON EUROPEAN PATENT APPLICATION NO. EP 22 19 7228

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-12-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004136205 A1	15-07-2004	DE 20314370 U1	18-12-2003
		GB 2405309 A	02-03-2005
		JP 3099625 U	15-04-2004
		TW 558942 U	21-10-2003
		US 2004136205 A1	15-07-2004
US 4652981 A	24-03-1987	NONE	
US 4186425 A	29-01-1980	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5366780 A **[0002]**
- US 6578981 B **[0003]**
- US 20140347845 A1 **[0004]**
- US 20040136205 A1 **[0005]**
- US 4652981 A **[0006]**