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(54) PORTABLE LOUDSPEAKER ENCLOSURE

TRAGBARES LAUTSPRECHERGEHÄUSE

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- **PATENT ABSTRACTS OF JAPAN vol. 1997, no. 01, 31 January 1997 (1997-01-31) & JP 08 246213 A (FUKUMOTO MAMORU), 24 September 1996 (1996-09-24)**
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Description

FIELD OF THE INVENTION

[0001] The invention relates to a loudspeaker enclosure provided to be worn by a user, said loudspeaker enclosure having the shape of a band.

BACKGROUND OF THE INVENTION

[0002] A device similar to the one mentioned in the first paragraph is known from document US 4 419 770. This document shows a wrist AM radio receiver that is housed in band-shaped loudspeaker enclosure. The loudspeaker enclosure in particular is a bracelet-like structure adapted to be removably wrapped about a user's wrist, which includes at least a bar antenna, a circuit board with an oscillating element thereon forming a reference oscillation source, and a single speaker. The bar antenna and the circuit board are spaced apart within the bracelet-like structure in the direction in which the latter is wrapped with the speaker also disposed in the bracelet-like structure between the bar antenna and the circuit board so as to minimize the influence on the bar antenna of pulses from the reference oscillation source.

[0003] Unfortunately, with the known loudspeaker enclosure it has emerged that since just a single speaker is provided, the ratio between the sound emanating area of the bracelet and the surface of the loudspeaker enclosure is very low. This is why the quality of sound reproduction achieved with the known embodiment is not optimal.

[0004] US2003/012397 A1 discloses an audio strap of speakers for playing audio information originating from an audio device.

[0005] JP 08 246213 A discloses a waist belt mounted with minispeakers.

[0006] US 4 070 553 A discloses a personal audio listening system to be worn by an individual listener on his neck, the system comprising a pair of speakers mounted within a flexible supporting body.

[0007] JP 58 191532 A discloses a radio receiver comprising a wrist fitting part of a band shape comprising a couple of speakers.

[0008] US 5 699 558 A discloses a garment fabricated to include an audio system positioned against the fetal cavity or womb of a pregnant woman and which provide music or audio stimulation of the fetus.

[0009] GB 2 148 058 discloses a supporting mechanism for electrical components, e. g. a radio, associated speakers, battery pack and an adaptor, supported and electrically connected by a band having spaced conductors. The band has openings on the surface through which the components make electrical contact with conductors.

OBJECT AND SUMMARY OF THE INVENTION

[0010] It is an object of the invention to provide a loudspeaker enclosure of the type mentioned in the first paragraph, which obviates the drawbacks described hereinbefore.

[0011] To achieve the object described above, characteristic features according to the invention are provided with a loudspeaker enclosure according to the invention, so that a loudspeaker enclosure according to the invention can be characterized as follows:

[0012] A loudspeaker enclosure provided to be worn by a user, said loudspeaker enclosure having the shape of a band, wherein the loudspeaker enclosure comprises at least two speakers. The loudspeaker enclosure consists of segments moveably connected to each other by means of wires , which wired connect the at least two speakers, the segments being connected by wires, wherein between the segments a gap is formed between the wires.

[0013] The provision of the characteristic features according to the invention results in the advantage that the quality of the reproduction of sound is significantly enhanced. Also the ratio between the sound emanating area of the bracelet and the surface of the loudspeaker enclosure is very high, thus providing a comparable high loudness with a small size. By using the inventive loudspeaker enclosure two runners for instance may therefore hear the same music while running which would be impossible or at least very inconvenient when two headphones are used instead.

[0014] If the loudspeaker enclosure forms a closed or opened ring in a wearing position, the advantage is achieved that the loudspeaker enclosure can be attached to a user very easily in a manner that falling off of the loudspeaker enclosure from the user is circumvented very effectively.

[0015] According to an embodiment of the invention the loudspeaker enclosure is designed as a belt. This provides the advantage that the loudspeaker enclosure can be wrapped around a user's waist very easily and that the surface of the loudspeaker enclosure provides enough space for a plurality of speakers.

[0016] However, it has proved to be particularly advantageous if the loudspeaker enclosure is designed as a bracelet or neckband. This achieves the advantage that the position of the loudspeaker enclosure can be changed very easily by moving the arm if the loudspeaker enclosure is in the from of a bracelet and that the loudspeaker enclosure is in a position near the ears if the loudspeaker enclosure is in the form of a neckband.

[0017] When the loudspeaker enclosure consists of segments moveably connected to each other, this provides the advantage that the size of the loudspeaker enclosure can be easily adapted by removing or adding segments.

[0018] If segments of the loudspeaker enclosure are connected to each other by means of hinges, removing

or adding segments can be done in a very simple way.

[0019] Producing the loudspeaker enclosure can be further simplified if segments of the loudspeaker enclosure are connected to each other by means of wires, which wires connect the at least two speakers. Since wires connecting the speakers are used for connecting the segments as well it is possible to connect the segments without an additional means, e.g. a hinge.

[0020] If the loudspeaker enclosure is made of an elastomeric material, the loudspeaker enclosure can be produced in a very simple way, wherein the possibility of giving the loudspeaker enclosure different designs is significantly increased.

[0021] Preferably the speakers are directly embedded in the elastomeric material. This provides the advantage that the production of the loudspeaker enclosure can be further simplified, wherein cleaning the loudspeaker enclosure is simplified as well. The possibility of a simple cleaning of the loudspeaker enclosure is particularly of advantage if the loudspeaker enclosure is worn during practicing sports.

[0022] According to yet another embodiment of the invention the loudspeaker enclosure comprises identical speakers. This achieves the advantage that the sound reproduction is essentially invariant even if the loudspeaker enclosure shifts around an arm neck or waist of the user. Also the production of such a loudspeaker enclosure is simplified that's to the use of identical speakers.

[0023] The advantage of a simple connectivity to external electronic devices is achieved if the loudspeaker enclosure comprises a socket for connecting an electronic device.

[0024] These and other aspects of the invention are apparent from and will be elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The invention will be described in greater detail hereinafter, by way of nonlimiting examples, with reference to the embodiments shown in the drawings, particularly in Figure 3. Aspects of the disclosure illustrated in Figures 1, 2, 4 and 5 are disclosed for a more comprehensive understanding of the invention.

Fig. 1 shows a loudspeaker enclosure according to a first aspect of the disclosure in the form of a bracelet.

Fig. 2 shows a loudspeaker enclosure according to a second aspect of the disclosure in the form of a bracelet.

Fig. 3 shows an embodiment of a loudspeaker enclosure according to the invention in the form of a bracelet.

Fig. 4 shows a loudspeaker enclosure according to a third aspect of the disclosure in the form of a belt.

Fig. 5 is a cross section along the line IV-IV in Fig. 4.

[0026] The figures are schematically drawn and not true to scale, and the identical reference numerals in different figures refer to corresponding elements. It will be clear to those skilled in the art that alternative but equivalent embodiments of the invention are possible without deviating from the true inventive concept, and that the scope of the invention will be limited by the claims only.

DESCRIPTION OF EMBODIMENTS

[0027] Fig. 1 shows a loudspeaker enclosure 1 in the form of a band that forms a bracelet. The loudspeaker enclosure 1 shown is of the form of an opened ring adapted to be removably wrapped about a user's wrist or ankle. The loudspeaker enclosure 1 comprises two or more speakers 2. The loudspeaker enclosure 1 shown in Fig. 1 comprises a plurality of speakers 2 being arranged around an axis of the loudspeaker enclosure 1 or bracelet respectively. The speakers 2 are conventional speakers as they are known from the state of the art. But nevertheless the basic construction of the speakers 2 is shown in Fig. 5 and described in further detail below. The sound emanating areas 3 of the speakers 2 face the outer surface of the bracelet or the loudspeaker enclosure 1 respectively.

[0028] Further a cord 4 for supplying an audio signal from an external electronic device to the speakers 2 is provided. The external electronic device can for instance be a portable audio rendering device, e.g. a radio or CD-player or an MP3 player. The loudspeaker enclosure 1 preferably comprises a socket 5, which the cord 4 can be plugged into. Alternatively, the cord 4 could form a unit with the loudspeaker enclosure 1 as well. Audio signals transmitted to the loudspeaker enclosure 1 are supplied to the speakers 2 by means of wires embedded in the loudspeaker enclosure 1. These wires are not shown in Fig. 1. Furthermore the speakers 2 are interconnected by means of said wires.

[0029] The loudspeaker enclosure 1 is made of an elastic homogenous material as described in further detail below. The speakers 2 are directly embedded in the homogenous material. This means there are no intermediate parts between the speakers 2 and the homogenous material.

[0030] Fig. 2 shows a loudspeaker enclosure 1' in the form of a band forming a bracelet that can be removably wrapped around a user's wrist or ankle. According to Fig. 2 the loudspeaker enclosure 1' forms a closed ring. Further the loudspeaker enclosure 1' or the band respectively consists of segments 6 connected to each other by means of hinges 7. Some or all of the segments 6 comprise conventional speakers 2. The sound emanating areas 3 of the speakers 2 face the outer surface of the bracelet or the loudspeaker enclosure 1' respectively. The speakers 2 are interconnected by means of wires. Audio signals are supplied to the speakers 2 by means of the cord 4. The cord 4 is connected by means of a plug 5' to a socket 5 of the loudspeaker enclosure 1'. But,

alternatively, the cord 4 can form a unit with one of the segments 6 as well.

[0031] If not all segments 6 are carrying a speaker 2, segments 6 not carrying a speaker 2 can be removed by opening or removing the hinges 7 if required. Thus the size of the loudspeaker enclosure 1' can be easily adapted to a user's needs.

[0032] According to the embodiment of the invention shown in Fig. 3 the loudspeaker enclosures 1" consist of segments 6'. Different from the loudspeaker enclosure shown in Fig. 2 the segments 6' carrying speakers 2 are interconnected by means of wires 14. The wires 14 further connect the speakers 2 carried by the segments 6'. Audio signals are supplied to the speakers 2 by means of the cord 4 and the wires 14. The cord 4 is connected to a socket 5 of the loudspeaker enclosure 1" by means of a plug 5'. But alternatively the cord 4 can form a unit with one of the segments 6' as well. According to the embodiment shown the segments 6' each comprise two speakers 2. But alternatively each segment 6' could carry any other number of speakers 2, too. It is obvious for those skilled in the art that some of the segments 6' could have no speakers 2 as well. Further the sound emanating areas 3 of the speakers 2 face the outer surface of the loudspeaker enclosure 1".

[0033] The aspect of the disclosure of Fig. 2 and the embodiment of Fig. 3 may be combined in that some of the segments 6 or 6' of the loudspeaker enclosures 1' or 1" are interconnected by means of hinges 7, wherein others of the segments 6 or 6' could be connected by means of the wires 14 or a single wire connecting the speakers 2.

[0034] Fig. 4 shows a loudspeaker enclosure 1"' in the form of a belt with a buckle 8. The loudspeaker enclosure 1'" forms a closed ring when it is worn around the waist of a user. The loudspeaker enclosure 1"' comprises speakers 2 embedded in the belt, wherein the sound emanating areas 3 of the speakers 2 face the surface farther from a user in mounted condition of the loudspeaker enclosure. Audio signals from an external audio source are supplied to the speakers 2 by means of the cord 4. According to a further aspect of the disclosure the loudspeaker enclosure 1'" can have the form of a neckband, too.

[0035] Fig. 5 shows a cross section along the line V-V in Fig. 4. The speakers 2 shown in Fig. 5 are of the same type as the speakers 2 shown in Figs. 1 to 3. Preferably the speakers 2 are identical. It should be mentioned that the speakers 2 of the embodiment shown in Fig. 3 and the aspects of the disclosures shown in Figs. 1, 2 and 4 form one or two rows respectively, but more rows of speakers 2 or any other arrangement of the speakers 2 could be provided, too. The speakers 2 comprise a magnetic circuit 9 and a so-called voice coil 10 connected with a diaphragm 11.

[0036] When an electrical signal is applied to the voice coil 10 via the cord 4 connecting the loudspeaker enclosure 1" with the external electronic device, the voice coil 10 causes the diaphragm 11 to oscillate and to reproduce sound at the frequency of the electrical signal applied. On the sound-emanating side 3 of the speaker 2 is provided a front portion 12 which opposes the diaphragm 11. This front portion 12 has a plurality of through holes 13 through which sound waves emitted from the diaphragm 11 are made to pass. It is further imaginable that the holes are sealed by means of a thin membrane, thus providing sound emanation on the one hand and protection of the speakers 2 against dirt for example on the other. The speakers 2 are interconnected by means of a wire 14a.

[0037] It should be mentioned that the audio signals supplied to the speakers 2 may be transmitted as analog signals as well as digital signals. In the latter case the loudspeaker enclosure 1, 1' 1", 1"' comprises additional means for transforming a digital signal into an analog signal and an amplifier for boosting the signal. Hence the loudspeaker enclosure 1, 1' 1", 1"' furthermore needs an energy supply which may be provided by means of a battery, an accumulator or solar cells for instance or may be provided by an additional wire for supplying the loudspeaker enclosure 1, 1' 1", 1"' with the supply voltage of electronic device.

[0038] It should furthermore be mentioned that the audio signals supplied to the speakers 2 could be transmitted from the electronic device to the loudspeaker enclosure 1 by means of a wireless connection instead of using the cord 4 as well. If the audio signal is transmitted by means of a wireless connection, all the loudspeaker enclosures 1, 1' 1", 1"' mentioned above comprise a respective receiving means for receiving the audio signal. This receiving means is not shown in the Figures and can for instance be a conventional "Bluetooth" receiving means. An autonomous energy source as mentioned above is needed here as well.

[0039] Furthermore, all the types of loudspeaker enclosures 1, 1' 1", 1"' mentioned above are preferably made of an elastomeric material. Elastomeric materials are shape-retainable, but flexibly ductile plastics. Elastomeric materials are for instance Polyurethane, Ethylene Propylene Diene Monomer (EPDM), rubbers based on Polychloroprene etc.

[0040] The use of Polyurethane is especially of advantage if the loudspeaker enclosure 1, 1', 1 ", 1 "' has the shape of a bracelet or a neckband since the character of the material can be adapted to the desired form very easily. Polyurethane can be made in a variety of textures and hardnesses by varying the particular monomers used and adding other substances. So if the loudspeaker enclosure 1, 1', 1", 1"' is of the form of a closed ring, a bracelet, the loudspeaker enclosure 1, 1', 1", 1"' can be made more flexible using Polyurethane by adding flexible Polyethylene glycol segments between urethane links.

[0041] The use of EPDM is particularly of advantage if the loudspeaker enclosure 1, 1', 1", 1"' has the form of a belt, since this material provides a high flexibility and a high dimensional stability.

[0042] Finally, the speakers 2 can be embedded in the

elastomeric material very easily during the production process. If the elastomeric material is a polyurethane in the form of a self hardening foam, the speakers 2 and the wire 14a or wires 14 connecting the speakers 2 can be pressed into the foam before hardening. A further advantage of the use of Polyurethane is that the weight of the loudspeaker enclosure 1, 1', 1", 1"' is significantly decreased.

[0043] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be capable of designing many alternative embodiments without departing from the scope of the invention as defined by the appended claims. In the claims, any reference signs placed in parentheses shall not be construed as limiting the claims. The word "comprising" and "comprises", and the like, does not exclude the presence of elements or steps other than those listed in any claim or the specification as a whole. The singular reference of an element does not exclude the plural reference of such elements and vice-versa. In a device claim enumerating several means, several of these means may be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

Claims

1. A loudspeaker enclosure (1") provided to be worn by a user, said loudspeaker enclosure (1") having the shape of a band, wherein the loudspeaker enclosure (1") comprises at least two speakers (2), wherein the loudspeaker enclosure (1") consists of segments (6') moveably connected to each other by means of wires (14), which wires (14) connect the at least two speakers (2), wherein the segments are connected without an additional means.

2. A loudspeaker enclosure (1, 1', 1", 1'") according to claim 1, wherein the loudspeaker enclosure (1, 1', 1", 1'") forms a closed or opened ring in a wearing position.

3. A loudspeaker enclosure (1"') as claimed in claim 1, wherein the loudspeaker (1"') enclosure is designed as a belt.

4. A loudspeaker enclosure (1, 1', 1") as claimed in claim 1, wherein the loudspeaker enclosure (1, 1', 1") is designed as a bracelet or neckband.

5. A loudspeaker enclosure (1, 1', 1", 1"') as claimed in one of the claims 1 to 4, wherein the loudspeaker enclosure (1, 1', 1", 1"') is made of an elastomeric material.

6. A loudspeaker enclosure (1, 1', 1", 1"') as claimed in claims 5, wherein the speakers (2) are directly embedded in the elastomeric material.

7. A loudspeaker enclosure (1, 1', 1", 1"') as claimed in claim 1, wherein the loudspeaker enclosure (1, 1', 1", 1'") comprises identical speakers (2).

Patentansprüche

1. Lautsprechergehäuse (1 "), das dazu vorgesehen ist, von einem Benutzer getragen zu werden, welches Lautsprechergehäuse (1 ") die Form eines Bands hat, wobei das Lautsprechergehäuse (1") wenigstens zwei Lautsprecher (2) aufweist, wobei das Lautsprechergehäuse (1 ") aus Segmenten (6') besteht, die mittels Drähten (14) beweglich miteinander verbunden sind, wobei die Drähte (14) die wenigstens zwei Lautsprecher (2) verbinden, wobei die Segmente ohne zusätzliche Mittel verbunden sind.

2. Lautsprechergehäuse (1, 1', 1", 1"') nach Anspruch 1, wobei das Lautsprechergehäuse (1, 1', 1", 1"') in Trageposition einen geschlossenen oder offenen Ring bildet.

3. Lautsprechergehäuse (1"') nach Anspruch 1, wobei das Lautsprechergehäuse (1"') als Gurt ausgebildet ist.

4. Lautsprechergehäuse (1, 1', 1 ") nach Anspruch 1, wobei das Lautsprechergehäuse (1, 1', 1") als Armband oder Halsband ausgebildet ist.

5. Lautspcechecgehäuse (1, 1', 1", 1'") nach einem der Ansprüche 1 bis 4, wobei das Lautsprechergehäuse (1, 1', 1", 1"') aus einem elastomeren Material hergestellt ist.

6. Lautsprechergehäuse (1, 1', 1", 1"') nach Anspruch 5, wobei die Lautsprecher (2) direkt in dem elastomeren Material eingebettet sind.

7. Lautsprechergehäuse (1, 1', 1", 1"') nach Anspruch 1, wobei das Lautsprechergehäuse (1, 1', 1", 1'") identische Lautsprecher (2) enthält.

Revendications

1. Enceinte de haut-parleur (1") prévue pour être portée par un utilisateur, ladite enceinte de haut-parleur (1") ayant la forme d'une bande, dans laquelle l'enceinte de haut-parleur (1") comprend au moins deux haut-parleurs (2), dans laquelle l'enceinte de haut-parler (1") se compose de segments (6') raccordés de manière mobile entre eux au moyen de fils (14),

lesquels fils (14) raccordent les au moins deux haut-parleurs (2), dans laquelle les segments sont raccordés sans moyen supplémentaire.

2. Enceinte de haut-parleur (1, 1', 1", 1"') selon la revendication 1, dans laquelle l'enceinte de haut-parleur (1, 1', 1", 1"') forme un anneau fermé ou ouvert dans une position dans laquelle on la porte.

3. Enceinte de haut-parleur (1"') selon la revendication 1, dans laquelle l'enceinte de haut-parleur (1"') est conçue comme une courroie.

4. Enceinte de haut-parleur (1, 1', 1") selon la revendication 1, dans laquelle l'enceinte de haut-parleur (1, 1', 1") est conçue comme un bracelet ou un collier.

5. Enceinte de haut-parleur (1, 1', 1", 1"') selon l'une quelconque des revendications 1 à 4, dans laquelle l'enceinte de haut-parleur (1, 1', 1", 1"') est réalisée avec un matériau élastomère.

6. Enceinte de haut-parleur (1, 1', 1", 1"') selon la revendication 5, dans laquelle les haut-parleurs (2) sont directement noyés dans le matériau élastomère.

7. Enceinte de haut-parleur (1, 1', 1", 1"') selon la revendication 1, dans laquelle l'enceinte de haut-parleur (1, 1', 1", 1"') comprend des haut-parleurs identiques (2).

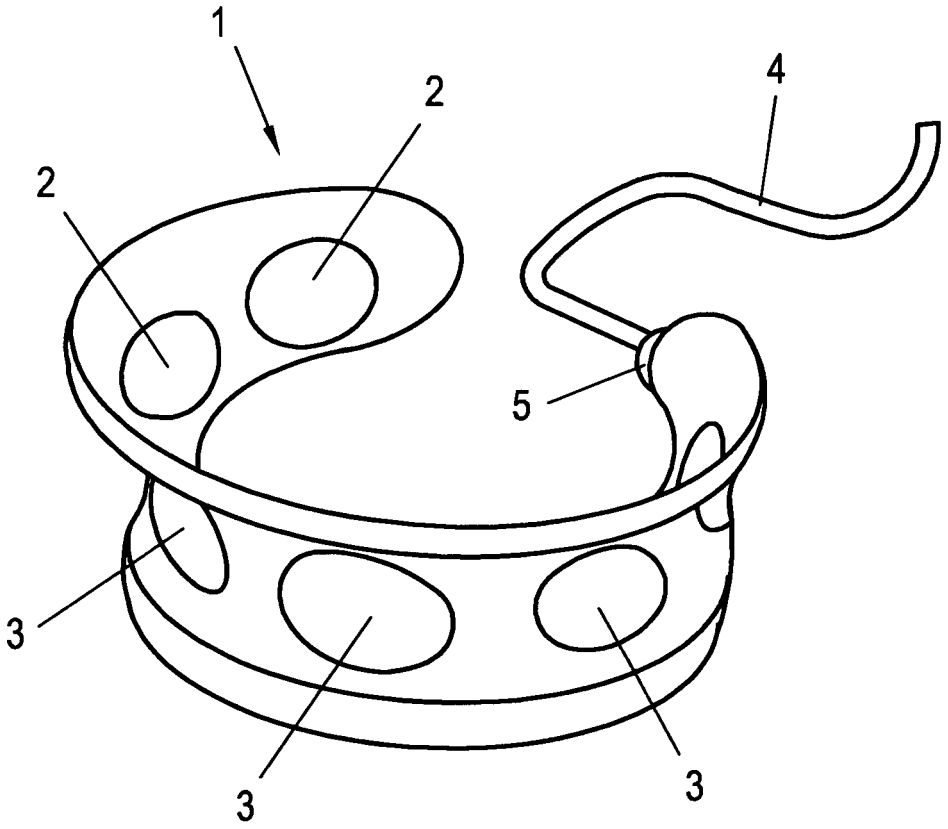

FIG. 1

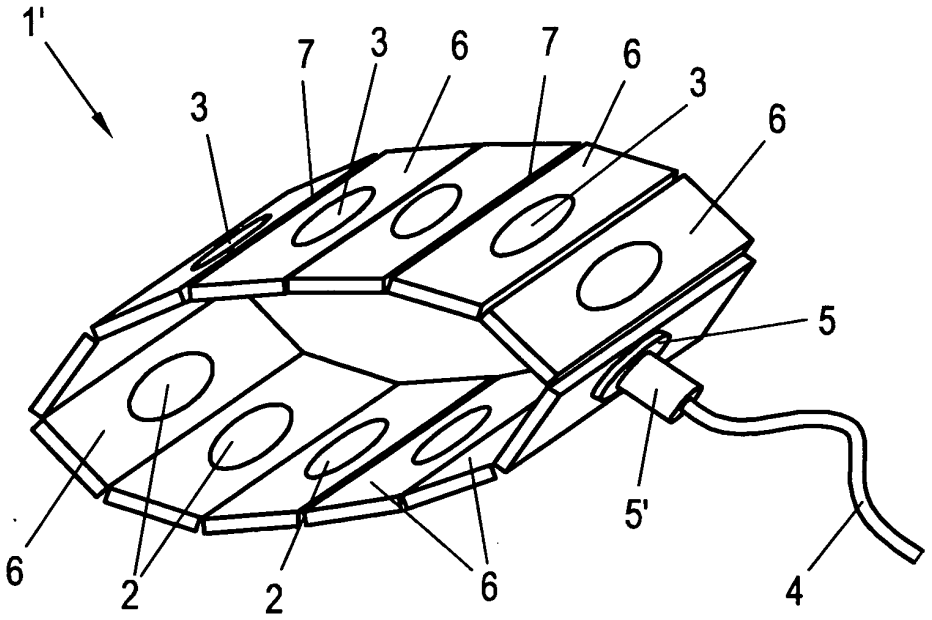

FIG. 2

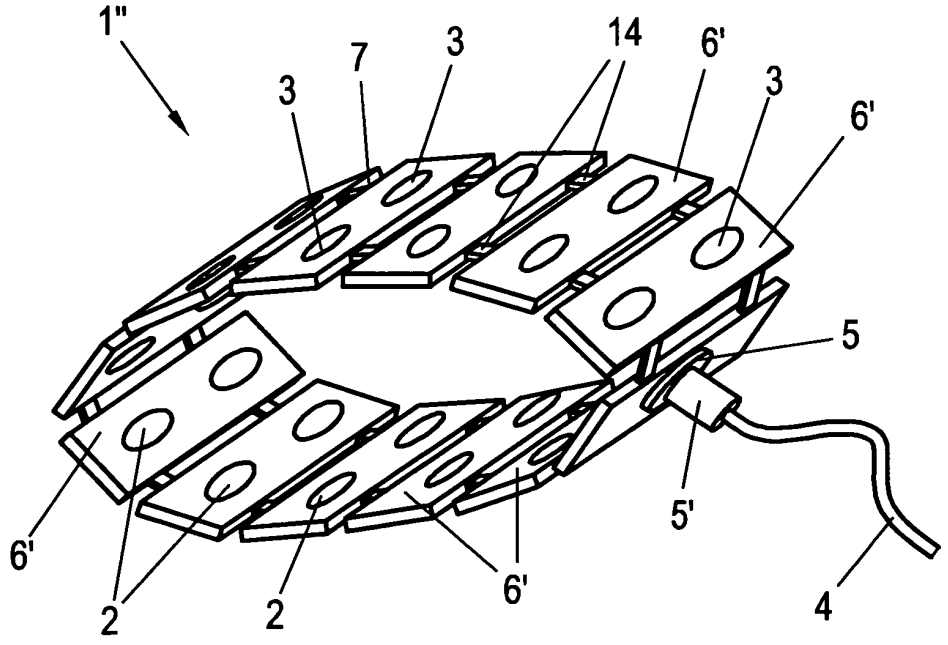

FIG. 3

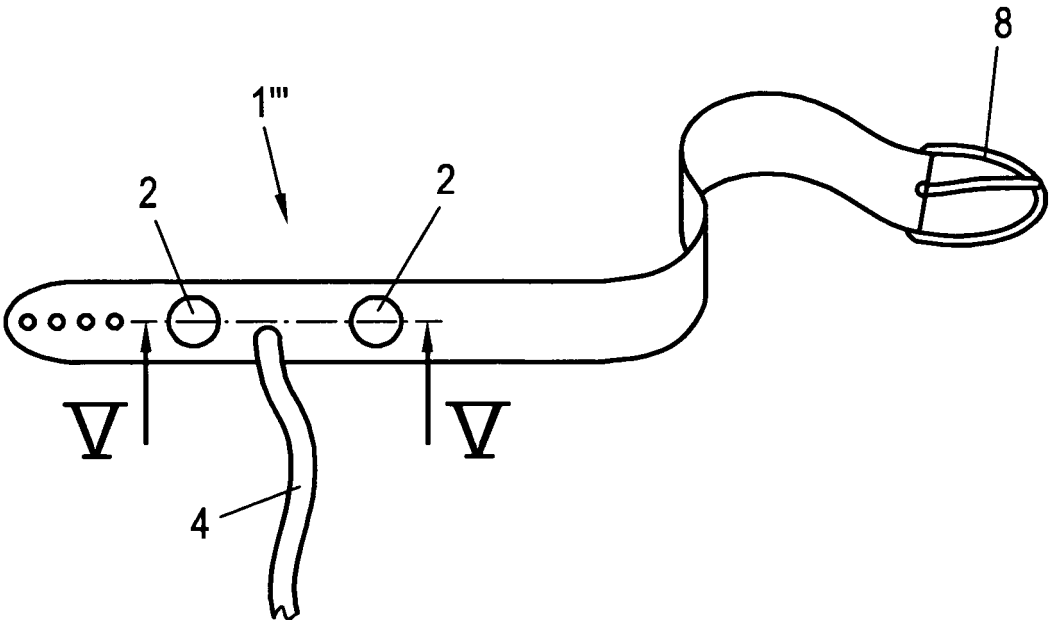

FIG. 4

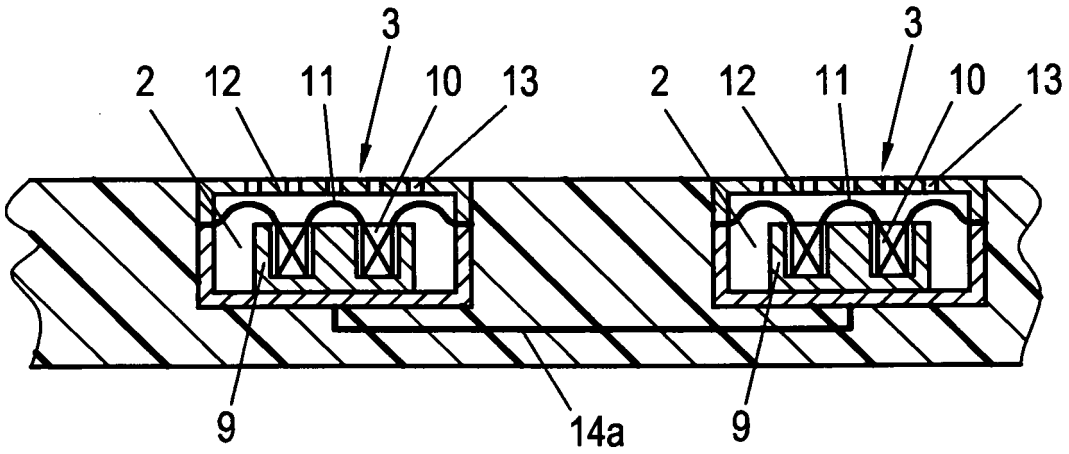

FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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