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(54) AN APPARATUS FOR REPRODUCING SOUNDS

VORRICHTUNG ZUR WIEDERGABE VON KLÄNGEN

APPAREIL DE REPRODUCTION DE SONS

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(73) Proprietor: **GD International S.r.l.**
43121 Parma (PR) (IT)

(72) Inventor: **ZECCA, Gabriele**
I-43121 Parma (IT)

(74) Representative: **Corradini, Corrado et al**
Ing. C. Corradini & C. S.r.l.
Via Dante Alighieri 4
42121 Reggio Emilia (IT)

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Description

TECHNICAL FIELD

[0001] The present invention relates to an apparatus for reproducing sounds, removably fixable to an electronic device such as a mobile telephone or a multimedia player of audio files or the like.

[0002] In greater detail, the present invention relates to an apparatus for reproducing sounds, provided with a sound loudspeaker which can be located in proximity to a user's ear.

PRIOR ART

[0003] As is known, a problem which occurs in the field of mobile telephony relates to enabling use of the mobile telephone, or other electronic device, while leaving the user's hands free, especially if the user is occupied in driving a vehicle, or maintaining the apparatus distant from the ear, so as to avoid damaging electromagnetic influences.

[0004] With this aim in mind, two different types of apparatus are known for reproduction of sound, also known as earphones, which are distinct from one another in the transmission modes of the sound signal branching from the electronic device to the acoustic loudspeaker.

[0005] The first known type exploits wireless technology, i.e. a communication without use of a cable, such as Bluetooth technology, which transmits the sound signal from the telephone, or from the audio tract reproducing device to a remote loudspeaker, which can be anchored to the user's ear.

[0006] Sound reproducing apparatus of this first type, while very comfortable for the user because of the lack of any cabling connecting them to the electronic device, also however exhibit the drawback of having to be equipped with a dedicated battery, which must be charged, the duration of which is limited and is further subject to wear.

[0007] In the second type of apparatus for reproducing sound the acoustic loudspeaker, i.e. the earphone, is connected to the end of an electric cable, an opposite end of which bears a male connector, of the jack type, which can be inserted in a female connector located in the electronic device.

[0008] The second type of sound reproducing apparatus, though not requiring any autonomous battery, as they take the signal directly from the electronic device supplying them electrically too, exhibit the drawback that the cable, which has to be kept separately, for connection between the electrical device and the earphone, often becomes tangled and therefore slow and laborious to use.

[0009] A further drawback linked to the use of the earphone, whether of the first or the second type, is that it is an independent element to be kept separately from the electronic devices, and therefore can easily be lost, for example in a car or a house.

[0010] A known reproducing apparatus is disclosed by the document US 2008/0080732 and by the document US5832098. This document discloses an electronic device carrying system having a retractable headphone assembly.

[0011] The carrying system is adapted to be associated to an electronic device.

[0012] A first plug configured to communicate with the electronic device is connected to a second plug on the front side of the housing, said plugs being connected by a connector cable secured to the housing.

[0013] A user controlled, spring operated spool secured to the housing is adapted to extend and retract a transducer assembly having at least one transducer and a headphone cable.

[0014] One or more conducting brackets are mounted within an aperture formed into the spool, the spool being configured to rotate about said second plug. The conducting brackets, each having a plurality of contact surfaces, electrically couple the transducer assembly to the second plug in a secure manner.

[0015] This type of electronic device carrying system has the drawback of the presence of a cable to connect the system to the electronic device, and to need undisclosed means to connect the system to the electronic device. Furthermore the electrical coupling of the transducer to the second plug is complicated and expensive.

[0016] An aim of the present invention is that it obviates the above-mentioned drawbacks of the prior art, especially in the field of earphone devices of the second above-described type, with a solution that is simple, rational and relatively inexpensive.

[0017] These aims are attained by the characteristics of the invention set out in the independent claim. The dependent claims delineate preferred and/or particularly advantageous aspects of the invention.

DISCLOSURE OF THE INVENTION

[0018] In particular, the invention discloses an apparatus for reproducing sounds, and/or to speak using the incorporated microphone, which comprises:

- a support body provided with engaging means suitable for engaging to an electronic device,
- one or two acoustic loudspeaker fixed to an end of a transmission cable of a sound signal, an opposite end of the cable being suitable for being operatively connected to the electronic device, and
- winding means supported by the support body and able to wind the transmission cable.

[0019] With this solution, the apparatus can easily be connected to the electronic device, occupying a contained space and remaining tidily stored and quick to use.

[0020] Further, the apparatus of the invention, which is coupled with the electronic device, is always available

to the user and ready for use at any time.

[0021] A male connector advantageously projects from the support body, and is fixed rigidly thereto; it can be inserted in a respective female connector of the electronic device, the male connector being a part of the connecting means. For example, the sole connection between the male connector of the apparatus and the female connector of the electronic device can realize the stable and substantially rigid connection of the support body to the electronic device.

[0022] Further, the connecting means can also comprise at least an elastically-yielding appendage branching from the support body and able to embrace at least a perimeter edge of the electronic device, or other equivalent means. The earphone is fixed to the free end of the cable wound on the spool; a first plate solidly constrained to the spool is fixed to the opposite end. A second plate, facing the first, is fixed to the support body and the cable branching from the male connector, or jack, is fixed to the second plate.

[0023] The cable wound on the spool comprises also a microphone.

[0024] The plates are two known conductor plates able to transmit electromagnetic signals in a known way.

[0025] The first and second conductor plates face one another, at a predetermined distance, and transmit the signal independently of the reciprocal orientation thereof.

[0026] The cable wound on the spool could comprise two separated wires each for one earphone, to be applied to both the ears of the user.

[0027] The said cable comprises a microphone.

[0028] Should the apparatus be of stereo type, it must comprise two separated transmission cables, and respective separated independent winding means supported by the support body and able to wind the transmission cables. Only one of said two independent cables comprises a microphone.

[0029] A further aspect of the invention provides a system for reproducing sounds which comprises an electronic device of the mobile telephone type, a music player or the like and an apparatus, as described herein above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] Further characteristics and advantages of the invention will emerge from a reading of the following description, provided by way of non-limiting example, with the aid of the figures illustrated in the appended tables.

Figure 1 is a rear view of a first embodiment of an apparatus for reproducing sounds, according to the invention, associated to a back of a mobile telephone.

Figure 2 illustrates section II-II of figure 1.

Figure 3 illustrates section III-III of figure 2.

Figure 4 is an explode axonometric view of a second embodiment of an apparatus for reproducing sounds, according to the invention, associable to the sum of a mobile telephone.

Figure 5 is a section view of figure 4.

BEST WAY OF CARRYING OUT THE INVENTION

[0031] With particular reference to the figures, 10 denotes in its entirety an apparatus for reproducing sound which is associable to an electronic device for generating the sound signal, such as for example a mobile telephone 1, as shown in the figures or a reproductive device of audio tracks, such as an audio track player or another like device.

[0032] In particular, the mobile telephone 1, apart from the functional keys for activating it, a screen realized on a wall of the casing and other elements, as known in the sector, is provided with a female connector 2, able to connect the mobile telephone 1 to a sound reproducing apparatus, such as for example an earphone, an acoustic loudspeaker device or the like.

[0033] The mobile telephone, for example, comprises an optical system for example a video camera and/or a photographic camera 3.

[0034] The apparatus 10 comprises a support body 11, of an internally-hollow box body, provided with a bottom wall 110, which can be rested on a wall of the mobile telephone 1, for example not the wall in which the screen is contained.

[0035] Together with the lateral walls 111 and the top wall 112, the bottom wall 110 defines the support body 11.

[0036] The support body 11 preferably exhibits a very modest spatial volume, such as to alter as little as possible the overall dimensions of the mobile telephone 1 to which it is fixed, and can be configured such as to exhibit a profile which adapts to the conformation of the model of mobile telephone for which it is destined.

[0037] In a first embodiment shown in figures from 1 to 3, the mobile telephone 1 is of the known "Blackberry" type and exhibits a female connector on one of the lateral flanks thereof, and the support body 11 is destined in use to be positioned with the bottom wall 110 adhering to the rear wall of the mobile telephone 1, i.e. the wall thereof opposite the screen.

[0038] The support body 11 comprises a first appendage 113 substantially perpendicular to the bottom wall 110 and destined to rest on the flank of the telephone comprising the female connector.

[0039] The first appendage 113 is entirely hollow and the cavity thereof is in communication with the internal cavity of the support body 11.

[0040] The support body 11 comprises a second appendage 114 opposite the first appendage 113.

[0041] The free end of the second appendage 114 is bent on the bottom wall defining a section conformed substantially in a C-shape therewith, such as to snap-fit on the body of the mobile telephone 1.

[0042] In practice, the first appendage 113 and the second appendage 114 substantially define a clamp that can block on the two opposite lateral flanks of the mobile tel-

ephone 1.

[0043] A male connector 20 projects from the first appendage 113, for example a jack connector, which can be inserted internally of the female connector 2 provided in the mobile telephone 1 for transmitting sound signals from the mobile telephone itself.

[0044] The apparatus 10 further comprises an acoustic loudspeaker 30, of an earphone type, that can be anchored to a user's ear, in a usual way. The earphone 30 is fixed to the free end 31 of an electric cable 32.

[0045] The male connector 20 is advantageously configured to keep the microphone of the mobile telephone 1 active, in a known way, so that the apparatus functions as a sound reproducer for the sounds generated by the mobile telephone itself.

[0046] The free end 31 of the cable 32, and therefore the earphone 30, is placed in use externally of the support body 11 or housed in a seating installed therein, such as to be in any case accessible from outside.

[0047] The cable 32 exhibits a length that is sufficient to maintain the mobile telephone 1 at a distance from the user's ear when the earphone is used, for example 50-100 cm, and is wound on the spool 35.

[0048] The opposite end 33 of the cable 32 is connected to a first conductor plate 34, for example quadrangular, which is solidly connected to the spool 35. The spool 35 is supported by a rotating pin 36 the ends of which are supported in rotation by respective cylindrical seatings 37 realised respectively in the bottom wall 110 and in the top wall 112 of the support body 11.

[0049] The first plate 34 faces parallel to a second conductor plate 21, which is internally fixed to the support body 11 and located at a determined distance known to technicians in the field.

[0050] The first plate 34 can rotate with respect to the second plate 21, maintaining the electromagnetic communication between the plates.

[0051] The second plate 21 is electrically connected directly to the male connector 20 by means of a further cable 22 of a limited length the end portion of which inserts in the internal cavity of the first appendage 113 such as to reach, from inside the support body 11, the male connector 20.

[0052] The spool 35 can wind the portion of cable 32 interposed between the free end 31 thereof and the opposite end 33, such that the acoustic loudspeaker 30 is mobile between an extracted position, in which the cable 32 is at least partially unwound from the spool 35, and a retracted position, in which the cable 32 is completely wound on the spool 35.

[0053] The spool 35 can be pushed by a mechanical spring 38 towards a rest position, such that with the traction of the cable 32 from the retracted position to the extracted position the mechanical spring 28 is loaded.

[0054] Further, the spool 35 comprises for example engaging means that can engage ratchet-fashion with teeth that in contrast to the action of the mechanical spring 38 prevent spontaneous rewinding of the cable 32 when the traction force exerted by the user thereon is removed.

[0055] The spool 35 can therefore wind the cable 32 on the axis of the spool only when a force, for example a traction force is first applied and then removed or, alternatively, when the user manually unblocks the spool 35 from the stable equilibrium position, for example by activating a control such as a button, fixed to the support body 11 and accessible externally thereof, which frees the mechanical spring 38.

[0056] Further, the apparatus 10 can comprise one or more buttons slidably associated to the support body 11 and able to press on any keys of the mobile telephone 1, for example at the keys dedicated to the volume control, the on/off switch of the mobile telephone or another key that might be present.

[0057] Finally, the apparatus 10 can comprise one or more through-holes or be provided with a transparent wall, which holes can be superposed on the optical system, if there is one, such as a video camera and/or a photo camera 3, of the mobile telephone 1.

[0058] In a second embodiment, shown in figure 4, able to be connected to a mobile telephone, for example an i-Phone, where the female connector is positioned in an upper wall, the support body 10 exhibits a slightly different shape with respect to the one described herein above.

[0059] The second embodiment is described in the following, in which the reference numbers of the drawings for the structural parts exhibiting the same functions are left unchanged.

[0060] In practice, the apparatus 10 comprises a support body 11 of the internally-hollow box body, for example substantially parallelepiped, which is provided with a bottom wall 110, which can be rested on a wall of the mobile telephone 1, where the female connector is present.

[0061] Four lateral walls 111 emerge from the bottom wall 110, closed by a top wall 112, for example parallel to the bottom wall 110.

[0062] The support body 11 preferably exhibits a decidedly modest spatial volume, such as to alter the overall dimensions of the mobile telephone 1 to which is fixed as little as possible, and can be configured such as to exhibit a profile that adapts to the conformation of the model of mobile telephone for which it is destined.

[0063] In the illustrated embodiment the support body 11 is defined by the above-described structural elements; it is however possible for it to have a border, denoted by number 114 (or appendages as described above), for example elastically yielding, which can surround the mobile telephone 1 over several sides thereof, and thus functioning also a protection against impacts, such as what is described in the broken line of figure 4.

[0064] A male connector 20 projects inferiorly from the bottom wall 110, for example a jack, which can be inserted internally of the female connector 2 provided in the mobile telephone 1 for transmitting sound signals from the mobile telephone.

[0065] Further, the apparatus 10 comprises an acous-

tic loudspeaker or earplug 30 which exits from the support body 11 and which is electromagnetically connected to the male connector 20, in the same way as the acoustic loudspeaker 30 described above for the first embodiment.

[0066] In this embodiment, also if the above-mentioned border is not present, the apparatus 10 connects to the mobile telephone 1 only through the male connector 20, which retains the apparatus 10 at the upper wall of the mobile telephone 1 and by a not discloses elastic appendage bracing the mobile telephone on the side opposite to the side comprising the male connector. The bottom wall 100 might be profiled in such a way as to exhibit recesses and reliefs which can act as abutting elements for the wall of the mobile telephone 1, such as to prevent the reciprocal rotation between the apparatus 10 and the mobile telephone itself with respect to the longitudinal axis of the male connector 20; further, the apparatus 10 can be configured such as to be connected at the back of the mobile telephone 1, as shown for the first embodiment described herein above.

[0067] In the light of the above, the apparatus 10 functions as follows.

[0068] For the sounds generated by the mobile telephone 1 to be reproduced through the acoustic loudspeaker 30 it is sufficient to connect the male connector 20 to the female connector 2. Once in this position the acoustic loudspeaker 30 can be distanced from the mobile telephone 1 by a simple traction of the cable 32.

[0069] The mono-directional rotation of the spool 35 enables the cable 32 to be unwound up to an endrun position, in which the earphone is in a totally extracted position.

[0070] Once the use of the acoustic loudspeaker 30 is to be terminated, it is sufficient to activate the button which will enable the automatic rotation in a reverse direction of the spool 35, by action of the mechanical spring 38, and which will return the acoustic loudspeaker 30 into the retracted position.

[0071] The invention as conceived is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept.

[0072] Further, all the details can be replaced by other technically-equivalent elements.

[0073] In practice the materials used, as well as the contingent forms and dimensions can be any according to needs, without forsaking the protective scope of the following claims.

Claims

1. An apparatus for reproducing sounds which comprises:

a support body (11) provided with connecting means (20, 114) suitable for connecting to an electronic device (1),

an acoustic loudspeaker (30) fixed to an end of a transmission cable (32) of a sound signal, an opposite end (33) of the cable being suitable for being operatively connected to the electronic device (1), and

winding means (35) supported by the support body (11) and able to wind the transmission cable (32),

wherein a male connector (20) rigidly projects from the support body (11) and is fixed rigidly thereto, which male connector (20) is suitable for being inserted in a respective female connector (2) of the electronic device (1), the male connector (20) at least in part defining the connecting means,

characterised in that the connecting means comprise at least an elastically yielding appendage (114) deriving from the support body (11) and suitable for embracing at least a perimeter edge of the electronic device (1), the appendage (114) being located on an opposite side to the side of the support body (11) in which the male connector (20) is present.

2. The apparatus of claim 1 **characterised by** comprising two separated transmission cables, at least one separated male connector and two separated winding means supported by the support body, to consent transmission of stereo signals.

3. The apparatus of the preceding claims, **characterised in that** it comprises a button fixed to the support body (11) and suitable for activating each winding means for automatically winding the transmission cable (32).

4. The apparatus (10) according to claim 1 or 2, wherein the winding means comprise a spool (35) rotatably associated to the support body (11).

5. The apparatus of claim 4, wherein the opposite end (33) of the transmission cable (32) is fixed to a first conductor plate (34) fixed to the spool (35), the male connector (20) being in turn connected by a further transmission cable (22) to a second conductor plate (21) facing the first plate (34) at a distance therefrom and fixed to the support body (21).

6. The apparatus of claim 1, wherein the support body (11) comprises a bottom wall (110) and first appendage (113) substantially perpendicular to the bottom wall (10) and destined to rest on the flank of the electronic device (1) comprising the female connector (2).

7. The apparatus of claim 6, wherein the elastically yielding appendage (114) is opposite the first appendage (113).

8. The apparatus of claim 6 or 7, wherein the first appendage (113) is entirely hollow and the cavity thereof is in communication with an internal cavity of the support body (11).

9. The apparatus of any one of the claims from 6 to 8, wherein the male connector (20) projects from the first appendage (113).

10. The apparatus of any of the preceding claims, wherein the support body (11) comprises an elastically yielding border that can surround the electronic device (1) for protection against impacts.

11. A system for reproduction of sounds which comprises an electronic device (1) of a mobile telephone type, a musical reader or the like and an apparatus according to any one of the preceding claims.

Patentansprüche

1. Vorrichtung zum Reproduzieren von Tönen, die Folgendes umfasst:

einen Trägerkörper (11), der mit Anschlussmitteln (20, 114) versehen ist, die zum Anschließen an ein elektronisches Gerät (1) geeignet sind,
einen akustischen Lautsprecher (30), der an einem Ende eines Übertragungskabels (32) für ein Tonsignal befestigt ist, wobei ein entgegengesetztes Ende (33) des Kabels dazu geeignet ist, funktionsfähig an das elektronische Gerät (1) angeschlossen zu sein, und
Wickelmittel (35), die vom Trägerkörper (11) getragen werden und im Stande sind, das Übertragungskabel (32) aufzuwickeln,
wobei ein Stecker (20) starr aus dem Trägerkörper (11) hervorsteht und starr daran befestigt ist, wobei der Stecker (20) dazu geeignet ist, in eine entsprechende Buchse (2) des elektronischen Geräts (1) eingeführt zu sein, wobei der Stecker (20) zumindest teilweise die Anschlussmittel definiert,
dadurch gekennzeichnet, dass die Anschlussmittel mindestens einen elastisch nachgiebigen Fortsatz (114) umfassen, der vom Trägerkörper (11) abgeht und dazu geeignet ist, mindestens eine Umfangskante des elektronischen Geräts (1) zu umfassen, wobei der Fortsatz (114) an einer Seite angeordnet ist, die jener Seite des Trägerkörpers (11) gegenüberliegt, in welcher der Stecker (20) vorhanden ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie zwei getrennte Übertragungskabel, mindestens einen getrennten Stecker und zwei getrennte, vom Trägerkörper getragene Wickelmittel umfasst, um eine Übertragung von Stereosignalen zu ermöglichen.

3. Vorrichtung nach den vorhergehenden Ansprüchen, **dadurch gekennzeichnet, dass** sie einen Knopf umfasst, der am Trägerkörper (11) befestigt und dazu geeignet ist, jedes Wickelmittel zwecks automatischen Aufwickelns des Übertragungskabels (32) zu betätigen.

4. Vorrichtung (10) nach Anspruch 1 oder 2, wobei die Wickelmittel eine Spule (35) umfassen, die dem Trägerkörper (11) drehbar zugeordnet ist.

5. Vorrichtung nach Anspruch 4, wobei das entgegengesetzte Ende des Übertragungskabels (32) an einer ersten Leiterplatte (34) befestigt ist, die an der Spule (35) befestigt ist, wobei der Stecker (20) wiederum durch ein weiteres Übertragungskabel (22) an eine zweite Leiterplatte (21) angeschlossen ist, die der ersten Platte (34) in einem Abstand gegenüberliegt und am Trägerkörper (21) befestigt ist.

6. Vorrichtung nach Anspruch 1, wobei der Trägerkörper (11) eine Bodenwandung (110) und einen ersten Fortsatz (113) umfasst, der im Wesentlichen senkrecht zur Bodenwandung (10) liegt und dafür vorgesehen ist, auf jener Flanke des elektronischen Geräts (1) aufzuliegen, welche die Buchse (2) umfasst.

7. Vorrichtung nach Anspruch 6, wobei der elastisch nachgiebige Fortsatz (114) dem ersten Fortsatz (113) gegenüberliegt.

8. Vorrichtung nach Anspruch 6 oder 7, wobei der erste Fortsatz (113) gänzlich hohl ist und sein Hohlraum in Verbindung mit einem inneren Hohlraum des Trägerkörpers (11) steht.

9. Vorrichtung nach einem der Ansprüche 6 bis 8, wobei der Stecker (20) aus dem ersten Fortsatz (113) hervorsteht.

10. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der Trägerkörper (11) eine elastisch nachgiebige Umrandung umfasst, der das elektronische Gerät (1) umgeben kann, um es vor Stößen zu schützen.

11. System zum Reproduzieren von Tönen, das ein elektronisches Gerät (1) von der Art eines Mobiltelefons, eines Musikwiedergabegerätes oder dergleichen und eine Vorrichtung nach einem der vorhergehenden Ansprüche umfasst.

Revendications

1. Appareil pour la reproduction de sons qui comprend :

un corps de support (11) doté de moyens de connexion (20, 114) adaptés pour la connexion à un dispositif électronique (1),
un haut-parleur acoustique (30) fixé à une extrémité d'un câble de transmission (32) d'un signal sonore, une extrémité opposée (33) du câble étant adaptée pour être fonctionnellement connectée au dispositif électronique (1), et
des moyens d'enroulement (35) supportés par le corps de support (11) et capable d'enrouler le câble de transmission (32),

dans lequel un connecteur mâle (20) fait rigidement saillie sur le corps de support (11) et est fixé à ce dernier, ledit connecteur mâle (20) est adapté pour être inséré dans un connecteur femelle (2) respectif du dispositif électronique (1), le connecteur mâle (20) définissant au moins en partie les moyens de connexion,
caractérisé en ce que les moyens de connexion comprennent au moins un membre élastique (114) provenant du corps de support (11) et adapté pour englober au moins un bord périphérique du dispositif électronique (1), le membre (114) étant situé sur un côté opposé au côté du corps de support (11) dans lequel figure le connecteur mâle (20).

2. Appareil selon la revendication 1, **caractérisé par le fait qu'**il comprend deux câbles de transmission séparés, au moins un connecteur mâle séparé et deux moyens d'enroulement séparés supportés par le corps de support, pour consentir à la transmission de signaux stéréo.

3. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend un bouton fixé au corps de support (11) et adapté pour l'activation de chaque moyen d'enroulement pour automatiquement enrouler le câble de transmission (32).

4. Appareil (10) selon la revendication 1 ou 2, dans lequel les moyens d'enroulement comprennent un enrouleur (35) rotativement associé au corps de support (11).

5. Appareil selon la revendication 4, dans lequel l'extrémité opposée (33) du câble de transmission (32) est fixé à une première plaque conductrice (34) fixée à l'enrouleur (35), le connecteur mâle (20) étant à son tour connecté par un autre câble de transmission (22) à une seconde plaque conductrice (21) orientée vers la première plaque (34) à une distance de cette dernière et fixé au corps de support (21).

6. Appareil selon la revendication 1, dans lequel le corps de support (11) comprend une paroi inférieure (110) et un premier membre (113) sensiblement perpendiculaire à la paroi inférieure (10) et destiné à reposer sur le flanc du dispositif électronique (1) comprenant le connecteur femelle (2).

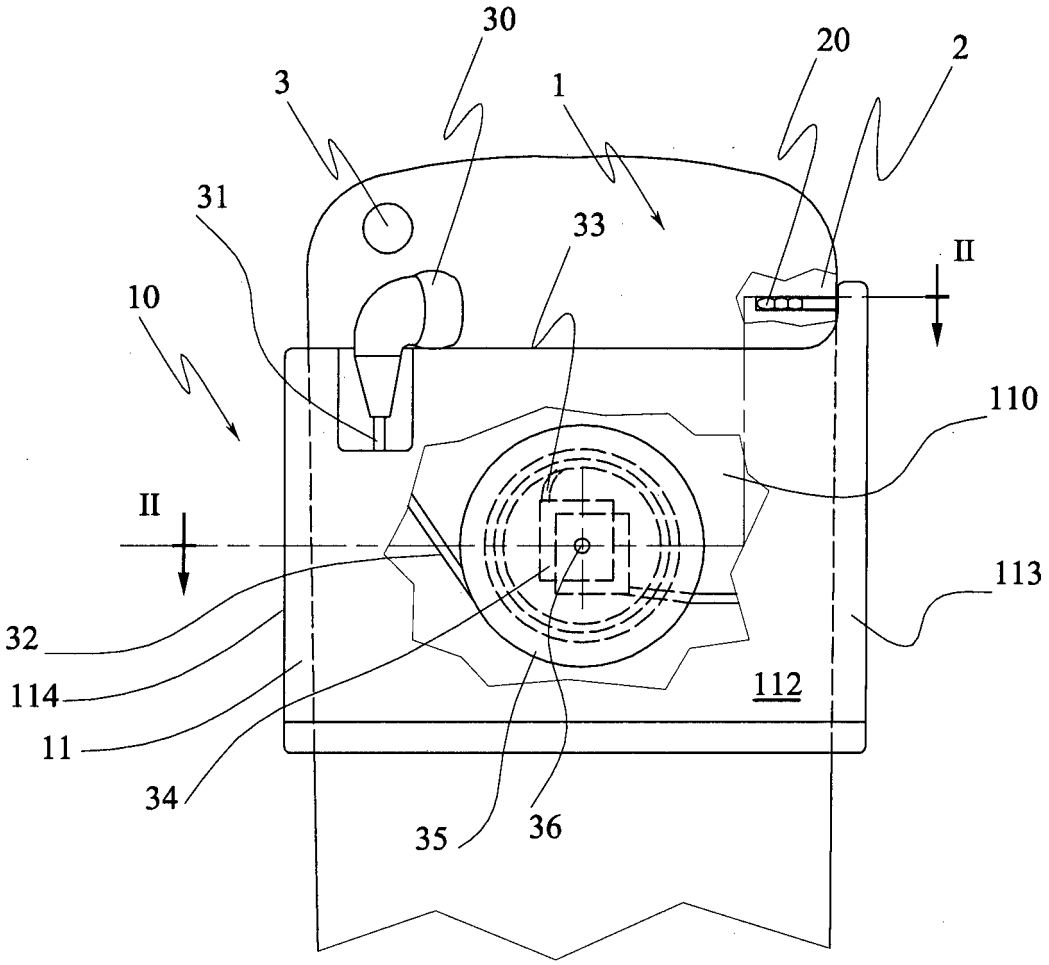
7. Appareil selon la revendication 6, dans lequel le membre élastique (114) est à l'opposé du premier membre (113).

8. Appareil selon la revendication 6 ou 7, dans lequel le premier membre (113) est entièrement creux et la cavité de ce dernier est en communication avec une cavité interne du corps de support (11).

9. Appareil selon l'une quelconque des revendications 6 à 8, dans lequel le connecteur mâle (20) fait saillie sur le premier membre (113).

10. Appareil selon l'une quelconque des revendications précédentes, dans lequel le corps de support (11) comprend un contour élastique qui peut entourer le dispositif électronique (1) pour le protéger contre les impacts.

11. Système pour la reproduction de sons qui comprend un dispositif électronique (1) d'un type de téléphone portable, un lecteur musical ou similaire, et un appareil selon l'une quelconque des revendications précédentes.


30
20
2
3
1
31
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110
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113
32
114
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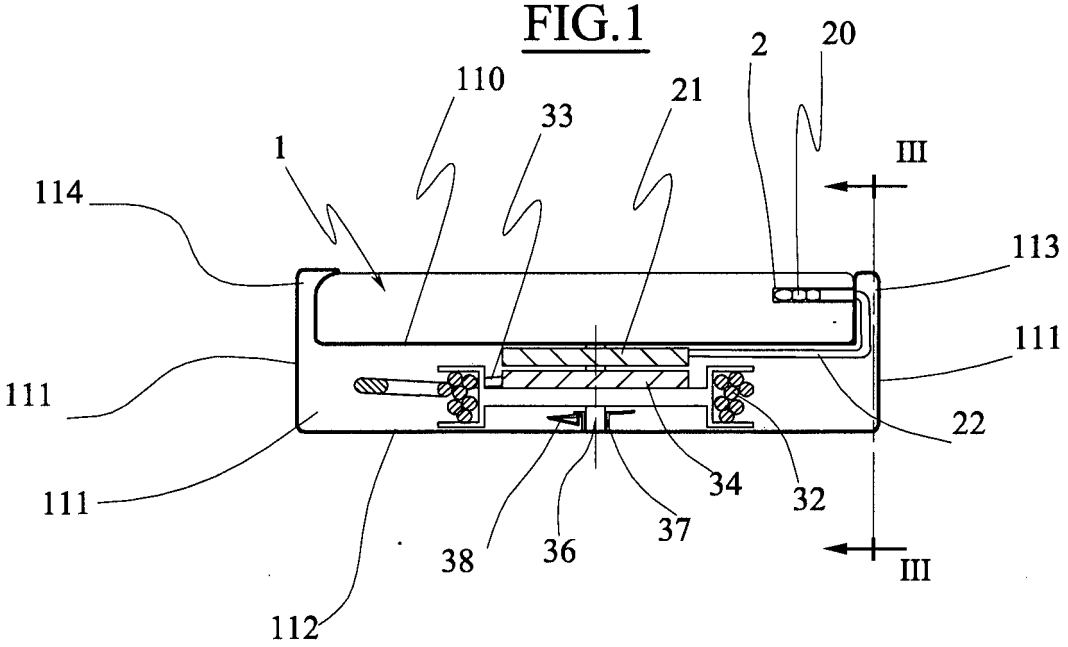
36

FIG.1


2
20
110
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33
III
1
114
113
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111
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34
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38
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III
112

FIG.2

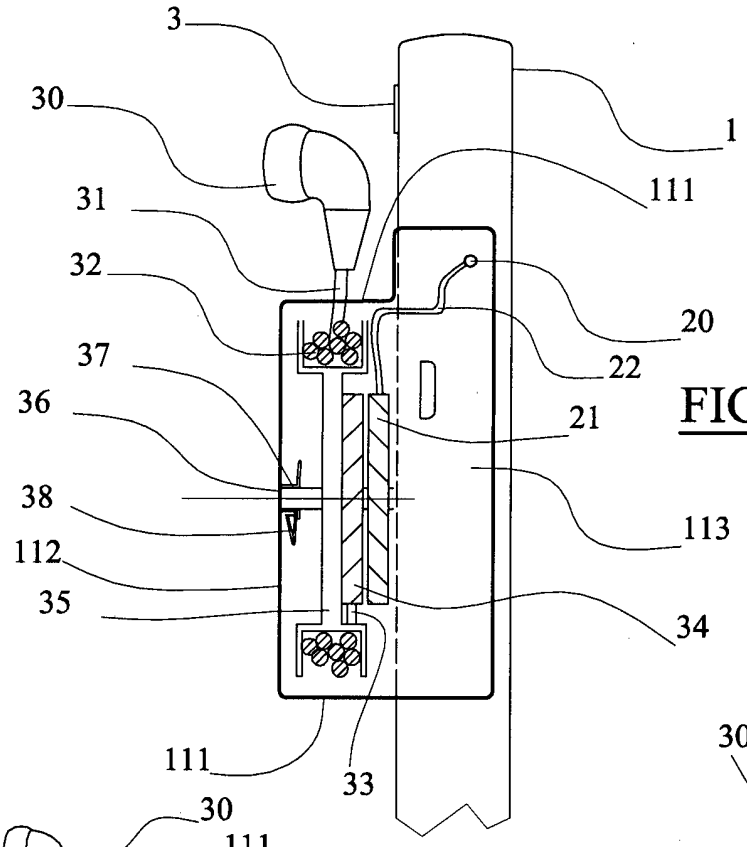

FIG.3

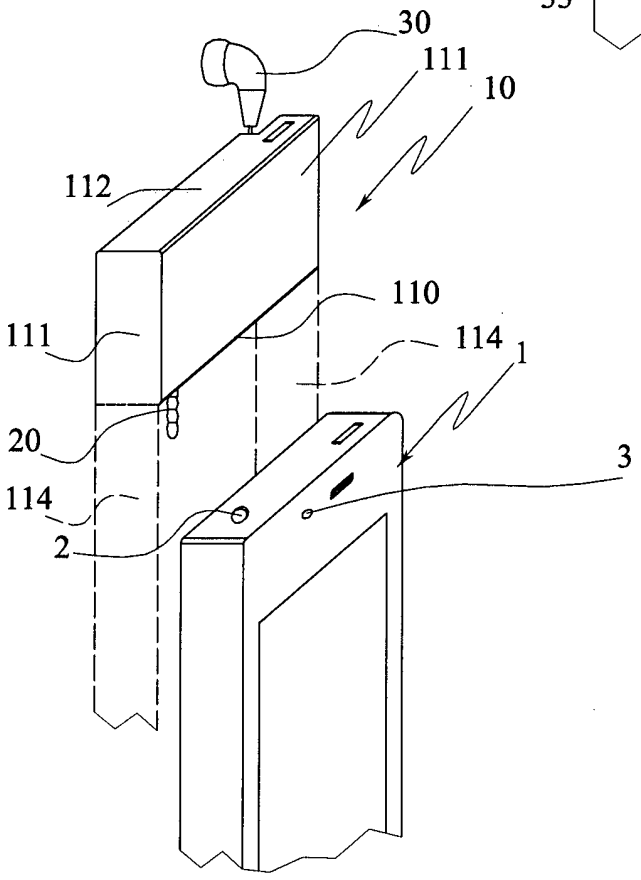

FIG.4

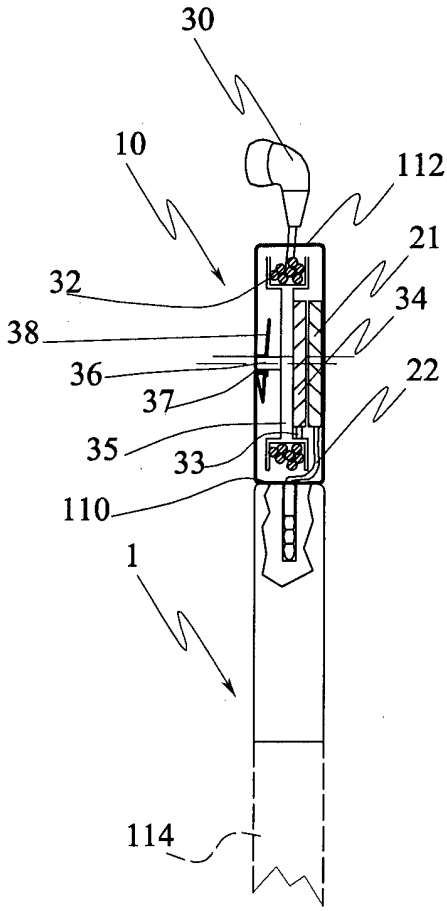

FIG.5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20080080732 A **[0010]**
- US 5832098 A **[0010]**