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

(11) EP 3 332 759 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.06.2018 Bulletin 2018/24

(51) Int Cl.:
A61H 23/02 *(2006.01)* ***H04R 5/02*** *(2006.01)*
H04R 5/04 *(2006.01)*

(21) Application number: **16202579.5**

(22) Date of filing: **07.12.2016**

(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:
MA MD

(71) Applicant: **Piechotta, Jürgen**
Vientiane Capital (LA)

(72) Inventor: **Piechotta, Jürgen**
Vientiane Capital (LA)

(74) Representative: **Gulde & Partner**
Patent- und Rechtsanwaltskanzlei mbB
Wallstraße 58/59
10179 Berlin (DE)

(54) SOUND CHAIR AND SOUND TRANSMITTING MODULES

(57) The present invention refers to a sound chair, which enables to physically feel the sensation of music and other vibrations, comprising: a chair (100) comprising a chair frame (110), a seat area (120), and an optional kneeling area (130); and at least two sound transmitter modules (200, 202, 204, 206) detachably connected to the chair (100), wherein at least one of the sound transmitter modules (200, 202, 204, 206) is adapted to transmit sound indirectly into the chair (100) via structure-borne sound.

A sound transmitter module (200) comprises a loudspeaker (210) adapted to generate sound, and a holding element (216) adapted to attach the loudspeaker (210) to an external attachment position, wherein the sound transmitter module (200) further comprises at least one contact plate (212), wherein the contact plate (212) is adapted to transmit the sound generated by the loudspeaker (210) to a specific part of a human body which is in contact with the contact plate (212).

The structure-borne sound experience of a user is enhanced by spatially distributing the application of structure-borne sound. Mechanical damping of excited structure-borne sound can thus be minimized.

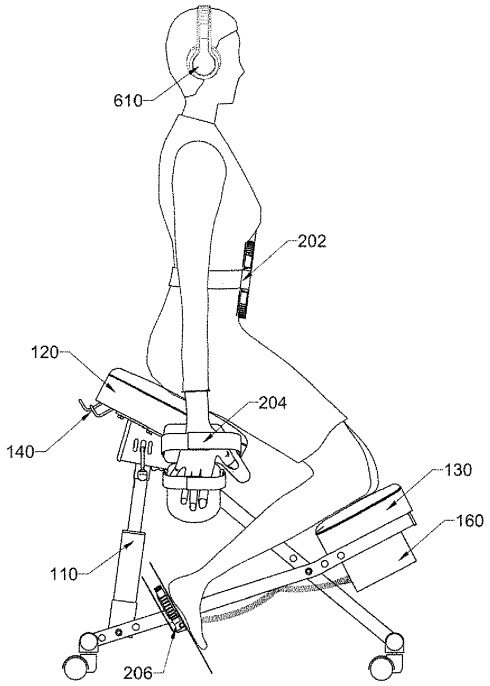

FIG. 8

EP 3 332 759 A1

Description

[0001] The present invention refers to a sound chair and sound transmitting modules. The sound transmitting modules are designed to enable the physical sensation of sound and vibrations (e.g. music, sound therapy sounds, brainwave entrainment sounds) by a user by means of a distributed structure-borne sound transmission via the skin, the bones or other parts of the user's body.

Technological Background

[0002] Sound is typically perceived by the ears of a listener through sound vibrations transmitted by air. In addition, it is possible to enhance the sound experience by adding physical vibrations perceived by the body of said listener due to the excitation of so-called body-borne sound, i.e. structure-borne sound within a (human) body. Typically, such devices for the excitation of body-borne sound are designed as chairs and a number of such sound chairs are commercially available. There have been a number of patent applications for sound chairs filed.

[0003] US 4,055,170 A discloses a health promoting apparatus comprising a chair, bed or the like with a loudspeaker incorporated therein. An opening formed in the chair is closed by a pretensioned flexible sheet. The sound waves from the loudspeaker cause the flexible sheet to vibrate, said vibrations being transmitted to a chair occupant.

[0004] US 8,638,966 B2 discloses a sound enhancing system including a haptic chair formed of a chair and plural speakers mounted to the chair. The speakers receive audio input from a subject audio source and generate corresponding sound vibrations. The chair is configured to deliver the generated sound vibrations to various body parts of a user seated in the chair through the sense of touch and by bone conduction of sound. A visual display viewable by the user corresponds to the generated sound vibrations and is indicative of the corresponding audio input. The sound enhancing system enhances user experience of the audio input visually, by the sense of touch, or by bone conduction of sound or any combination thereof.

[0005] US 2011/0251535 A1 discloses an apparatus and method for introducing multisensory integration. The apparatus includes an ergonomically contoured seating device, at least one vibrating acoustic device, at least one plate for dispersing vibration throughout the entire seating device, a rotatable mechanism for rotating the seating device.

[0006] US 5,101,810 A discloses an apparatus for therapeutic application of vibro-acoustic energy to a human body, including a closed box with at least one sound opening in which is arranged a loudspeaker directed towards a part of the body. Upholstery is disposed between the box and the body at the location of the loudspeaker and has air passages. Low frequency signals are supplied to the loudspeaker and to one or a plurality of external loudspeakers. Music is supplied to the external loudspeakers. The low frequency signals are influenced either in step with the music, in a predetermined relation to the music, or in predetermined rhythm. As storage medium for sound there may be used a tape cassette or compact disc in which at least one of the sound channels contains the influenced low frequency signal in the frequency range 30-120 Hz and the remaining sound channels contain pure music.

[0007] All these sound chairs use a regular chair or other kinds of bases that lead to enhanced acoustic damping of an excited body-borne sound and reduced sound sensations. In a regular chair, the user's full weight is under high pressure mainly applied to only the seating area of the chair or large parts of the body are in direct contact with the chair. In both cases, strong mechanical coupling between the user's body and the chair is generated due to a high contact pressure or a large contacted area, respectively. Any produced body-borne sound will thus be preferably conducted to the ground via the frame of said chair or base. Therefore, the user's body should be more isolated or even fully decoupled from the chair. Furthermore, in prior art products, the vibrating parts are directly attached to the chair or other kind of bases, and cannot be separately used. These sound chairs mostly vibrate as a whole, thereby forwarding the vibrations to body of a user. While some chairs are also targeting only certain body parts (haptic chairs), the means for forwarding vibrations are permanently fixed to the chair. A permanent direct connection of said means for forwarding vibrations to the chair increases the mechanical load for exciting an acoustic body vibration and provides only reduced body sensations to a user.

[0008] The objective problem of the invention is therefore to provide an enhanced body-borne sound experience. Furthermore, the excitation of body-borne sound should be distributed all over the body to increase the body-borne sound sensation and the efficiency of the body-borne sound excitation.

Summary of Invention

[0009] The invention solves the objective problem by providing a sound chair as defined in claim 1 and a sound transmitter module as defined in claim 12.

[0010] A sound chair according to the present invention enables to physically feel the sensation of music and other vibrations by comprising: a chair comprising a chair frame, a seat area, and an optional kneeling area; and at least two sound transmitter modules detachably connected to the chair, wherein at least one of the sound transmitter modules is adapted to transmit sound directly into the chair via structure-borne sound (e.g. within the physical structure of a human body as so-called body-borne sound). Furthermore, at least one of the sound transmitter modules may be adapted to transmit sound

directly into the chair via a direct mechanical connection to the chair frame.

[0011] A sound transmitter module according to the present invention comprises a loudspeaker adapted to generate sound and a holding element adapted to attach the loudspeaker to an external attachment position, wherein the sound transmitter module further comprises a contact plate, wherein the contact plate is adapted to transmit the sound generated by the loudspeaker to a specific part of a human body which is in contact with the contact plate. A sound transmitter module according to the present invention may further comprise a frame adapted to (directly or indirectly) hold the loudspeaker (or a multitude of loudspeakers).

[0012] The contact between the contact plate and a specific part of a human body (e.g. hands, belly, chest, feet) can be directly (i.e. on the bare skin) or indirectly via the clothing of a user (e.g. textiles, shoes, socks). Furthermore, the contact can be established by intermediate means positioned between the contact plate and the specific part of a human body. Intermediate means could be, for example, rubber pads, any kind of hygienic protection or sound-carriers (e.g. sound-carrying gels). The sound transmitter module generates a body-borne sound sensation inside a user's body (e.g. a human body) by exciting, for example, acoustic waves travelling along the skin, within the soft parts of the human body and/or via conducting through the bones. Thereby, the term "body" may also include the clothes and other body-like objects (e.g. prostheses).

[0013] The invention is based on the finding that the local coupling of a user's body to a chair can be reduced by providing a smaller seating area with reduced body contact region (e.g. a sitting roll providing a minimized seating area instead of the typically wide seating area of a regular chair) or by reducing the contact pressure between the user's body and the chair (e.g. in a stand seat, in which the seating area (e.g. a seating plate) supports the weight of the user only partially). Furthermore, the local coupling can be reduced by distributing the user's weight to at least two distinct support areas: a seat area to accommodate the posterior of the user and a kneeling support area to accommodate at least a part of the legs of a user (e.g. the shins, the knees, and/or the thighs). The weight of a user can thus be distributed to at least two localized contact areas on the chair. This reduces the local coupling between the user's body and the chair and leads to reduced mechanical damping of body-borne sound within these regions. Seat area and kneeling area accommodate only a fraction of the weight of the user's body while the total contacted area is relatively small compared to a conventional (easy)chair as sound chair base.

[0014] Furthermore, sound transmitter modules according to the present invention can be used individually without requiring a chair as a basis. In this case, the intensification of the body-borne sound sensation is achieved by distributing the body-borne sound excitation all over the body of a user. The sound transmitter modules can then be applied for using them without a chair or on any seating furniture as, for example, chairs, sofas, stools, or kneeling benches. When the user stands freely during use, only the feet of a user are in contact with the ground and ground coupling can be neglected compared to other body-borne sound excitation devices like conventional sound chairs as any excited body-borne sound is transmitted to the feet of the user before it can be damped by the ground.

[0015] The seat area and the kneeling area are mechanically connected by a chair frame for a, preferably tilt-free, set up of the chair on the ground. The chair frame can provide further contact plates to additionally support the user inside the chair. At least one of the sound transmitter modules can be adapted to transmit sound directly into the chair via a direct mechanical connection to the chair frame. Said sound transmitter module can also provide a contact plate adapted to transmit sounds indirectly into the chair via structure-borne sound over the body of a user (i.e. via body-borne sound). The body-borne sound experience can be further enhanced by spatially distributing sound transmitter modules to different parts of the user's body. The produced body-borne sound can thus be physically coupled and guided to the whole rest of the body of the user preferably via waves travelling along the skin and in-body transmission via the bones. When the distributed sound transmitter modules are not directly coupled to the chair (i.e. indirectly coupled via the body of the user) the efficiency of the body-borne sound excitation can be enhanced. A direct mechanical excitation of the chair by all sound transmitter modules is not required and damping via ground coupling is reduced.

[0016] The present invention differs from prior art sound chairs by including individual sound transmitter modules, which can be attached to a user's body. Because the sound transmitter modules can be used independently of each other, this allows the user to use the sound transmitter modules on a base (i.e. a chair), but also enables use off or without a sound chair according to the present invention, for example, while sitting on a sofa or lying on a bed. The loudspeakers comprised by the sound transmitter modules may receive audio inputs from an audio source through an amplifier to generate corresponding sound waves which are then transmitted to parts of the user's body through surfaces contacted by contact plates. Such delivery of vibrations enhances the user's experience of the sounds (e.g., music, frequencies, binaural beats) and can support the user to achieve a state of increased focus, relaxation or increased energy.

[0017] The chair frame can be a solid frame, stand or chassis. Preferably, the bottom side of the chair frame comprises three or four chair legs on which it can rest on the ground. More preferably, the bottom side of the chair frame comprises two rockers on which it can rest on the ground. The seat area and a kneeling area of the chair

are preferably facing in a direction opposite to the ground. They are preferably installed at the upper region of the chair frame of the chair (i.e. located opposite to the bottom side of the chair).

[0018] The sound transmitter modules are adapted to produce and transmit sound. Preferably, the sound is produced via a loudspeaker. The sound can be audible or non-audible (ultrasound, infrasound) to a human. The sound transmitter modules are detachably connected to the chair. For body-borne sound generation, they can be attached to different parts of a human body thus that the produced sound is preferably transmitted indirectly into the chair (i.e. via the body of the user) during use of a sound chair according to the present invention. At least one of the sound transmitter modules may be adapted to transmit sound directly into the chair via a direct mechanical connection to the chair.

[0019] Preferably, the chair is a kneeling chair, a kneeling seat or a balance chair. A kneeling chair is a chair where a person sits with its legs bend in a triangular fashion. The corners of that triangle are the posterior of the sitting person, their knees and their feet. Characteristically, parts of the person's weight are supported by a seat plate as seat area and a kneeling plate as kneeling area to support the knees (or a related part of the legs) of a person. A kneeling seat is a special type of a kneeling chair where the shins of a user are oriented more or less parallel to the ground (angle of inclination approximately between 0° to 20°). In a kneeling chair the shins of a user are inclined to a predefined angle of about 20° to 80° from vertical (opposed to 90° in a normal chair). With lower angles, more of the user's weight is typically supported by parts of the legs instead of mainly the posterior. In addition to such a kneeling position, a balance chair further enables the user to lie down while being supported at more than two support areas. Typically, within a kneeling chair the person's weight is at least supported by a seat plate as seat area and a kneeling plate as kneeling area (can also be called leg support area). In an alternative embodiment of the invention, a common chair (with or without backrest) can also be used for seating in combination with one or more individual sound transmitter modules.

[0020] Preferably, at least one of the sound transmitter modules comprises a holding element adapted to attach the sound transmitter module to a specific part of a human body. These parts of a human body can be, without any restriction, the hands, the belly, the chest, the head, the breast, the legs, and/or the feet. Preferably, the holding element can be a belt or a strap. The strap can be flexible or rigid. The mechanical properties of the holding element (e.g. length, strength, or width) can be different to adapt to the requirements of the various parts of a human body.

[0021] Preferably, at least one of the sound transmitter modules comprises a holding element adapted to attach a means to connect of a sound chair according to the present invention, wherein a direct mechanical connection to the chair frame is established for transmitting sound directly into the chair. The means to connect is part of the chair. In particular, the means to connect is part of the chair frame. A means to connect can be a carrier for at least one sound transmitter module. Preferably, the means to connect can be a carrier for two individual sound transmitter modules for the feet. The holding element can be a rod which can be attached on the means to connect.

[0022] Preferably, the means to connect can comprise a means for twisting to allow a twisting of attached sound transmitter modules around an elongated axis of the means to connect. Thereby, the term "twisting" means inclining or revolving at least one sound transmitter module independent to another sound transmitter module around said elongated axis.

[0023] Preferably, a sound chair according to the present invention comprises a means for fixation adapted to fixate a means to connect to different positions along the chair frame. The means for fixation can be, for example, a bolted connector, a pin connector, a moveable slider with locking function, or a clamping connector. The term "fixation" means fastening something firmly in position. Preferably, the means for fixation establishes, via a means to connect, a direct connection between the chair frame and two sound transmitter modules for the feet, wherein the sound transmitter modules for the feet are attached to the means to connect via a corresponding holding element.

[0024] Preferably, the chair comprises a means to attach a sound source for attaching a sound source to the chair. For example, such a means to attach a sound source could be a case, a pocket, a shelf, a pouch or a compartment. The means to attach a sound source to the chair can be permanently fixed or detachably connected to the chair.

[0025] Preferably, the chair comprises a means to attach a sound amplifier for attaching a sound amplifier to the chair. For example, such a means to attach a sound source can be a case, a pocket, a shelf, a pouch or a compartment. The means to attach a sound amplifier to the chair can be permanently fixed or detachable connected to the chair.

[0026] Preferably, the sound chair comprises a splitter to provide the sound transmitter modules and/or further external sound devices (like loudspeakers, headphones, etc.) with signals from a sound source. A splitter may be a passive or an active device for distributing a single input signal to multiple outputs. Especially, the splitter is preferably adapted to split up a signal of the sound source to provide said signal to sound transmitter modules. Preferably, the splitter can be detachably connected to the sound chair. The splitter can further be detachably attached to a user's body or a user's clothing.

[0027] Preferably, the chair comprises hooks to detachably connect the sound transmitter modules to the chair. The hooks can be open hooks or closed loops. Preferably, the hooks allow to hang or put sound transmitter modules onto the chair. Specifically, said hooks

may allow hanging or putting sound transmitter modules for the hands, sound transmitter modules for the belly and the chest onto the chair.

[0028] Preferably, the chair comprises a power line connector. The power line connector can be adapted to provide electric energy to a sound source, a sound amplifier, and/or a sound transmitter module. The electric energy can be high voltage (i.e. power line voltage) and/or low voltage (i.e. small appliances voltage).

[0029] Preferably, the sound chair comprises one or more sound transmitter modules which can be detachably attached to a chair or any suitable other device, or which can be attached directly to a targeted body part of a user. At least one loudspeaker on the sound transmitter modules can receive a sound input through a sound amplifier, which receives the sound input from a sound source. Exciters, vibration speakers, transducers or bass shakers are preferably used as loudspeakers.

[0030] The sound transmitter modules can comprise one or more loudspeakers, one or more contact plates, speaker cables, and a holding element. Furthermore, the sound transmitter modules can comprise a frame. For attaching to a body, a preferred holding element is a belt or a strap. For connecting to a sound chair's means to connect, preferably a clamping connector, a clip-in connector or a bolted connector is used as corresponding holding element. Optionally, said holding element can be a connector in the form of a rod which can be detachable attached to said means to connect by a connecting element (e.g. a nut).

[0031] The contact plates are preferably made from well-vibrating materials (e.g. metals, plastics or wood) and shaped in consideration of the body part to which they will be addressed. The contact plates can be glued or in another way attached to the vibrating part (e.g. membranes) of a loudspeaker. As a result, the contact plates can vibrate according to the sounds or vibrations emitted by the loudspeakers. The other side of the contact plate can be put directly or indirectly (e.g. through clothes) in touch with the skin of a targeted body part, enabling the user to perceive the produced vibrations.

[0032] Speakers produce the physical sounds/vibrations. On their vibrating parts, they can be glued or in another way attached to the contact plates. Typically on the side opposite to their vibrating parts, they can be glued or in another way attached to the corresponding frame. The loudspeakers may receive their sound inputs from a sound source, preferably through an amplifier. They may be connected to the sound source or the sound amplifier by loudspeaker cables.

[0033] A frame may hold all parts of the sound transmitter modules in place. The frame can be made from metal (e.g. aluminum), plastics or wood. The shape of the frame may follow the shapes of the targeted body parts, e.g., the belly and the chest, the hands or the feet of a human body. Preferably, the frame consists of a flat part, which may be adapted to attach the loudspeakers, a mechanism (e.g. via a hole or by a button) to hold the holding element, and/or a mechanism to hang the sound transmitter modules on a sound chair according to the present invention or any other device.

[0034] Preferably, the sound source is a mobile phone, a portable music player, a tablet, a computer, a MP3 or MP4 player, or any other portable or non-portable audio device. The sound source can be external or being integrated into the chair.

[0035] The sound amplifier links the loudspeakers to the sound source. The power of the sound amplifier (measured in Watts) and other technical variables (mainly the electric resistance measured in Ohm) should be matched to the nominal output power and other technical variables of the loudspeakers. The sound amplifier preferably has buttons to adjust the volume, the bass and the treble. The sound amplifier may preferably be connected by cables to the loudspeakers of all sound transmitter modules. Preferably, coiled cables are used that are long enough to enable a user to drag the sound transmitter modules into a position of usage on and off the chair. Preferably, a stereo set-up is chosen and all sound transmitter modules on the same side of a sound chair according to the present invention or a human body wearing sound transmitter modules need to be fed by all channels of the respective side (synchronization of sounds). For the sound transmitter modules for the belly and chest, a monoaural channel might be used. The sound amplifier is preferably connected to the sound source by a jack cable. Preferably, a splitter is used in between a sound source and a sound amplifier, to enable the sound source to connect not only to the sound amplifier but also to additional external headphones or further external loudspeakers.

[0036] The present invention differs from prior art sound chairs by including individual modules which can, for example, be attached to a user's body. The independence of the individual modules allows the user to use the device on its base (i.e. the chair), but also enables usage off the sound chair, for example, while sitting on a sofa or lying on a bed. The loudspeakers may receive audio inputs from an audio source through an amplifier and generate corresponding sound waves which are then transmitted to body parts of the user through contact plates. Such delivery of vibrations enhances the user's experience of the sounds (e.g., music, frequencies, binaural beats) and can support the user to achieve states of increased focus, relaxation or increased energy.

[0037] Further aspects of the invention can be learned from the following description.

Brief Description of the Drawings

[0038] In the following, the invention will be described in further detail. The examples given are adapted to describe the invention.

Fig. 1 shows a perspective view of an exemplary embodiment of a sound chair according to the

present to the present invention;

Fig. 2 shows perspective views of an exemplary embodiment of a sound transmitting module for the belly and the chest according to the present invention;

Fig. 3 shows perspective views of an exemplary embodiment of a sound transmitting module for the hands according to the present invention;

Fig. 4 shows perspective views of an exemplary embodiment of a sound transmitting module for the feet according to the present invention;

Fig. 5 shows perspective views of an exemplary electronic set up for sound generation;

Fig. 6 shows perspective views of an exemplary embodiment of a chair according to the present invention;

Fig. 7 shows a schematic description of electronic connections;

Fig. 8 shows a schematic view of an exemplary posture of a human sitting on an exemplary embodiment of a sound chair according to the present invention; and

Fig. 9 shows a schematic view of an exemplary posture of a human sitting on a kneeling bench wearing sound transmitter modules according to the present invention.

Detailed Description of the Invention

[0039] Fig. 1 shows a perspective view of an exemplary embodiment of a sound chair according to the present invention. The sound chair comprises a chair 100 and five sound transmitting modules 200 detachably connected to the chair frame 110 of the chair 100. Furthermore, a sound amplifier 300, a sound source 400 and a splitter 500 as the electronic parts of the sound chair are shown.

[0040] Fig. 2 shows perspective views of an exemplary embodiment of a sound transmitting module for the belly and the chest 202 according to the present invention. The module is a special type of a general sound transmitting module 200 of the invention. It is preferably attachable to the belly or the chest of a user. The sound transmitting module for the belly and the chest 202 is shown as complete device. Furthermore, detailed schematics of the main elements of the module are depicted. The sound transmitting module for the belly and the chest 202 typically comprises two loudspeakers 210 adapted to generate sound, a frame 214 adapted to hold the loudspeakers 210, a common speaker cable 218 (could be separate speaker cables for each individual loudspeaker 210), and a holding element 216 adapted to attach the frame 214 to an external attachment position. In particular, the holding element 216 is a kind of strap or band to be able to attach the sound transmitting module for the belly and the chest 202 to the belly and the chest of a human body (i.e. the user). The frame 214 holding the two loudspeakers 210 has a straight shape such that the attached loudspeakers 210 emit in a common single direction. Preferably, the loudspeakers 210 are arranged to each other in a distance of more than 5 cm, more preferably between 5 cm and 10 cm, more preferably more than 10 cm, even more preferably more than 25 cm. The sound transmitter module for the belly and the chest 202 further comprises contact plates 212, wherein the contact plates 212 are adapted to transmit the sound generated by the loudspeakers 210 to a specific part of a human body which is in contact with the contact plates 212. In particular, the contact plates 212 are adapted to contact the belly and the chest of the user and therefore to transmit the sound generated by the loudspeakers 210 to these regions of the user's body.

[0041] A typical sound transmitting module for the belly and the chest 202 uses one or two loudspeakers 210 for transmitting sound via the contact plate 212 to the belly and chest of the user. Preferably, the contact plates 212 have a circular shape. They can be provided in different sizes to adapt to specific user requirements. The module is movable and may be directly attached to the body of the user.

[0042] Fig. 3 shows perspective views of an exemplary embodiment of a sound transmitting module for the hands 204 according to the present invention. The module is a special type of a general sound transmitting module 200 of the invention. It is preferably attachable to the hands of a user. The sound transmitting module for hands 204 is shown as complete device. Furthermore, detailed schematics of the main elements of the module are depicted. The sound transmitting module for the hands 204 typically comprises two loudspeakers 210 adapted to generate sound, a frame 214 adapted to hold the loudspeakers 210, a common speaker cable 218 (could be separate speaker cables for each individual loudspeaker 210), and two holding elements 216 adapted to attach the frame 214 to an external attachment position. In particular, the holding elements 216 are a kind of strap or band to be able to attach the sound transmitting module for the hands 204 to the hands of a human body (i.e. the user). The frame 214 holding the two loudspeakers 210 has a bend shape, such that the attached loudspeakers 210 emit in different directions. Preferably, the directions enclose an angle larger than 5°, more preferably larger that 10°, more preferably larger that 25°, even more preferably larger than 50°. Most preferred the directions enclose an angle between 35° and 45° (approximately 40°) allowing a natural hand position for the user when using the sound transmitting module for the hands 204. The sound transmitter module for the hands 204 further comprises two contact plates 212, wherein the contact plates

212 are adapted to transmit the sound generated by the loudspeakers 210 to a specific part of a human body which is in contact with the contact plates 212. In particular, the contact plates 212 are adapted to contact the hands of a user and therefore to transmit the sound generated by the loudspeakers 210 to these regions of the user's body.

[0043] A typical sound transmitting module for the hands 204 uses one or two loudspeakers 212 for transmitting sound via the contact plate 212 to the hands of the user. Preferably, the contact plates 212 may have a shape fitted to the palm of the user's hand. They may be provided in different sizes to adapt to specific user requirements. The module is movable and may be directly attached to the body of a user.

[0044] Fig. 4 shows perspective views of an exemplary embodiment of a sound transmitting module for the feet 206 according to the present invention. The module is a special type of a general sound transmitting module 200 of the present invention. It is preferably attachable to a means to connect 170 of a sound chair according to the present invention. The sound transmitting module for the feet 206 is shown as complete device which is attached to said means to connect 170. Furthermore, detailed schematics of the main elements of the module are depicted. The means to connect 170 is not a part of the sound transmitting module for the feet 206, but a part of the chair 100 of a sound chair according to the present invention (cf. Fig. 6). Each sound transmitting module for the feet 206 typically comprises a loudspeaker 210 adapted to generate sound, a speaker cable 218, and a holding element 216 adapted to attach the sound transmitting module for the feet 206 to an external attachment position. In particular, the holding element 216 (e.g. a rod like holding element) is adapted to attach the sound transmitting module for the feet 206 to the means to connect 170 via a means for twisting 172 (e.g. a ball-baring or a general rotary bearing). The means to connect 170 is attached to the chair frame 110 of a corresponding chair 100, wherein a direct connection to the chair 100 is established for transmitting sound directly into the chair 100 via a direct mechanical connection to the chair frame 110. The sound transmitter modules for the feet 206 further comprise contact plates 212, wherein the contact plates 212 are adapted to transmit the sound generated by the loudspeakers 210 to a specific part of a human body which is in contact with the contact plates 212. In particular, the contact plates 212 are adapted to contact the feet of a user and therefore to transmit the sound generated by the loudspeakers 210 to these regions of the user's body. Contact to the user may be made via the bare feet, or the user may be wearing shoes or socks as part of the clothing.

[0045] A typical sound transmitting module for the feet 206 uses one or two loudspeakers 212 for transmitting sound via the contact plate 212 to the feet of a user. Preferably, the contact plates 212 have a rectangular or rectangular-like shape. They may be provided in different sizes to adapt to specific user requirements. The sound transmitting module for the feet 206 are preferably attached to a chair 100 or other suitable device in a detachable manner by a means to connect 170. The means to connect 170 may comprise a means for twisting 172 and/or a means for fixation 174. Preferably, a sound transmitting module for the feet 206 can comprise a cover 215 at the backside of a loudspeaker 210. The speaker cables 218 may be attached to the sound transmitting module for the feet 206.

[0046] Preferably, the sound transmitting module for the feet 206 can be detached from the means to connect 170 such that it can then be used independently of the chair 100. Preferably, the means to connect 170 and the holding element 216 of the sound transmitting module for the feet 206 are interconnected by a connecting element 171 (e.g. a nut or a clamp). The interconnection allows a twisting (i.e. rotating, turning, etc.) of the sound transmitting module for the feet 206 along an axis of the means to connect 170 via the means for twisting 172. The interconnection can be opened to allow the detachment of sound transmitter modules for the feet 206 from the chair 100, and using them off the chair 100 or on another device.

[0047] Fig. 5 shows perspective views of an exemplary electronic set up for sound generation. A sound source 400 is connected by an extension cable 710 (depicted as variable in length by a kind of rolling mechanism) to a splitter 500. The splitter 500 splits up the incoming sound signals and outputs them to independent jack cables 700. The jack cables 700 transmit the sound signals to a sound amplifier 300 (which is connected to the loudspeakers of the sound transmitting modules), external loudspeakers 610 and external headphones 600.

[0048] Fig. 6 shows perspective views of an exemplary embodiment of a chair 100 according to the present invention. The depicted chair 100 is a kind of a kneeling chair and comprises a chair frame 110, a seat plate 120, and a kneeling plate 130. Several hooks 140 for detachably attaching sound transmitter modules 200 to the chair frame 110 are shown. The chair 100 further comprises a means to attach a sound source 150, a means to attach a sound amplifier 160, and a means to connect 170 for connecting a sound transmitting module for the feet 206.

[0049] The means to connect 170 comprises a means for twisting 172 which enables to twist a connected sound transmitter modules for the feet 206 around the long axis of the means to connect 170. The means for twisting 172 may comprise a hinge, which can be attached to a holding element 216 of a sound transmitter module for the feet 206.

[0050] The means to connect 170 can further comprise a means for fixation 174 adapted to fixate the means to connect 170 at different positions along the chair frame 110 of the chair 100. Preferably, the means for fixation 174 is based on a sliding mechanism which enables the means to connect 170 to be slide up and down the lower edge of the chair frame 110. A sliding mechanism allows

users with different leg lengths to comfortably use a sound chair according to the present invention. Preferably, the sliding mechanism comprises of a lower base and an upper base which are attached to the chair frame 110 of the chair 100 or another suitable device. The sliding mechanism can be held in place, for example, by a bolt in the sliding mechanism and a nut of the sliding mechanism. Fig. 7 shows a schematic description of electronic connections. A sound source 400 is connected by an extension cable 710 to a splitter 500. The splitter 500 splits up the incoming sound signals and outputs them to independent jack cables 700. The jack cables 700 transmit the sound signals to a sound amplifier 300, external loudspeakers 610 and external headphones 600. The sound amplifier 300 amplifies the audio input and sends the amplified sound signal via individual audio cables 218 to two sound transmitter modules for the hands 204, a single sound transmitter module for the belly and the chest 202, and two sound transmitter modules for the feet 206. The sound transmitter module for the hands 204 each have two loudspeakers 210, the sound transmitter module for the belly and the chest 202 has two loudspeakers 210, and the sound transmitter modules for the feet 206 each have a single loudspeaker 210.

[0051] Fig. 8 shows a schematic view of an exemplary posture of a human sitting on an exemplary embodiment of a sound chair according to the present invention. The human is a user of a sound chair according to the present invention. The depicted human carries headphones 610, a sound transmitter module for the belly and the chest 202, two sound transmitter modules for the hands 204 (only one is shown), and two sound transmitter modules for the feet 206 (only one is shown). The user is supported by the chair frame 110 through a seat plate 120 and a kneeling plate 130. The feet of the user are resting on the sound transmitter modules for the feet 206 which are directly connected to the chair frame 110. The figure further shows a means to attach a sound amplifier 160 and two hooks 140 to detachably connect the various sound transmitter modules 202, 204, 206 to the chair 100 when the sound transmitter modules 202, 204, 206 are not in use.

[0052] Fig. 9 shows a schematic view of an exemplary posture of a human sitting on a kneeling bench 102 wearing sound transmitter modules 200 according to the present invention. A kneeling bench 102 is a special type of a general chair. The depicted human carries headphones 610, a sound transmitter module for the belly and the chest 202, two sound transmitter modules for the hands 204 (only one is shown), and two sound transmitter modules for the feet 206 (only one is shown). The two sound transmitter modules for the feet 206 are attached to the feet of the user. The figure further shows a splitter 500, a sound amplifier 300, and a sound source 400 which are electrically interconnected to provide sounds from the sound source 400 to the different parts of the human.

Reference List

[0053]

100	Chair
102	Kneeling bench
110	Chair frame
120	Seat area
130	Kneeling area
140	Hooks
150	Means to attach a sound source
160	Means to attach a sound amplifier
170	Means to connect
171	Connecting element
172	Means for twisting
174	Means for fixation
200	Sound transmitter modules
202	Sound transmitter module for the belly and the chest
204	Sound transmitter module for the hands
206	Sound transmitter module for the feet
210	Loudspeaker
212	Contact plate
214	Frame
215	Cover
216	Holding element
218	Speaker cable
300	Sound amplifier
400	Sound source
500	Splitter
600	Headphones (external)
610	Loudspeakers (external)
700	Jack cable
710	Extension cable
800	Power connector

Claims

1. Sound chair, comprising:

a) a chair (100) comprising a chair frame (110) and a seat area (120); and
b) at least one sound transmitter modules (200, 202, 204, 206) detachably connected to the chair (100);

characterized in that

c) at least one of the sound transmitter modules (200, 202, 204, 206) is adapted to transmit sound indirectly into the chair (100) via structure-borne sound.

2. Sound chair according to claim 1, the chair (100) further comprising a kneeling area (130).

3. Sound chair according to one of the proceeding

claims, wherein at least one of the sound transmitter modules (200, 202, 204, 206) is adapted to transmit sound directly into the chair (100) via a direct mechanical connection to the chair frame (110).

4. Sound chair according to one of the proceeding claims, wherein the chair (100) is a kneeling chair, a kneeling seat or a balance chair.

5. Sound chair according to one of the proceeding claims, wherein at least one of the sound transmitter modules (200, 202, 204) comprises a holding element (216) adapted to attach the sound transmitter module (200, 202, 204) to a specific part of a human body.

6. Sound chair according to proceeding claims 6 or 7, wherein the means to connect (170) comprises a means for fixation (174) adapted to fixate the means to connect (170) to different positions along the chair frame or other part (110) of the chair (100).

7. Sound transmitter module (200), comprising:

a) a loudspeaker (210) adapted to generate sound, and
b) a holding element (216) adapted to attach the loudspeaker (210) to an external attachment position,

characterized in that

c) the sound transmitter module (200) further comprises at least one contact plate (212),
d) wherein the contact plate (212) is adapted to transmit the sound generated by the loudspeaker (210) to a specific part of a human body which is in contact with the contact plate (212).

8. Sound transmitter module (200) according to claim 7, further comprising a frame (214) adapted to hold the loudspeaker (210).

9. Sound transmitter module (200) according to claims 7 or 8, adapted to connect to a sound amplifier (300).

10. Sound transmitter module (200) according to one of claims 7 to 9, adapted to directly or indirectly connect to a sound source (400).

11. Sound transmitter module (200) according to one of claims 7 to 10 comprising of one or more belts as holding element (216).

12. Sound transmitter module (200) according to one of claims 7 to 11 comprising of one or more straps as holding element (216).

13. Sound transmitter module (200) according to one of claims 7 to 12 comprising of a speaker cable (218) to connect directly or indirectly to a sound amplifier (300).

14. Sound transmitter module (200) according to one of claims 7 to 13 adapted to connect directly or indirectly to a sound source (400).

15. Sound transmitter module (200) according to one of claims 7 to 14 adapted to connect directly or indirectly to a splitter.

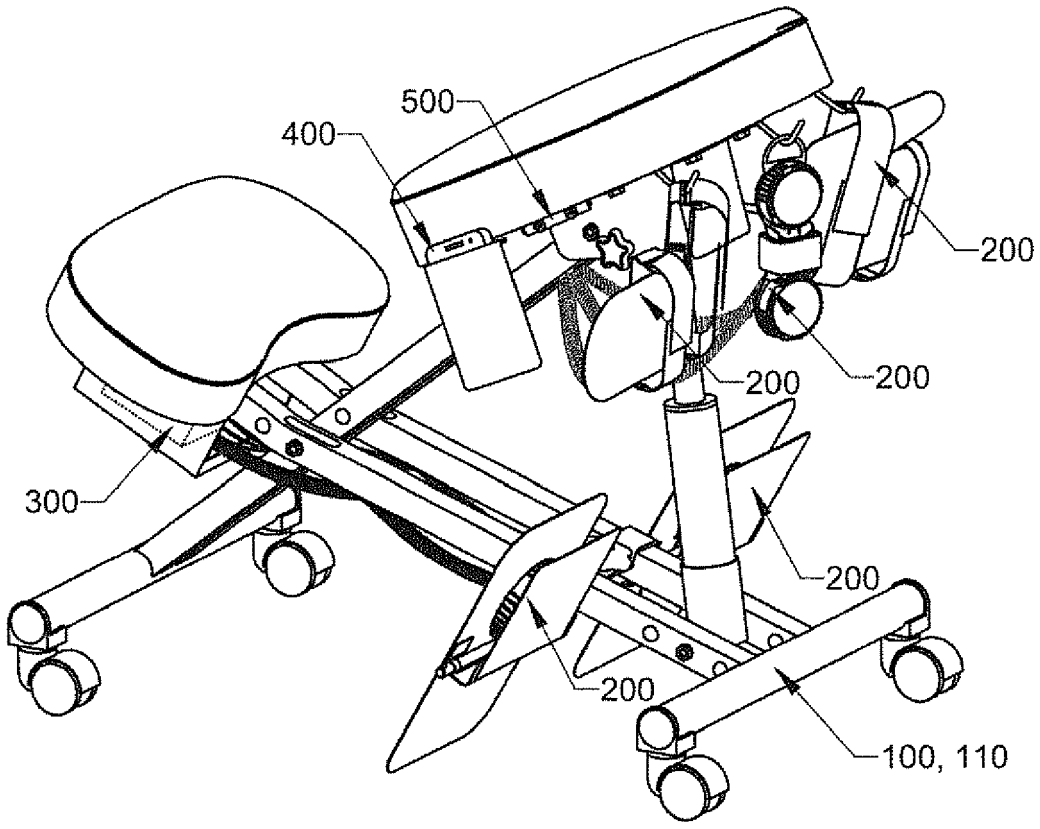

FIG. 1

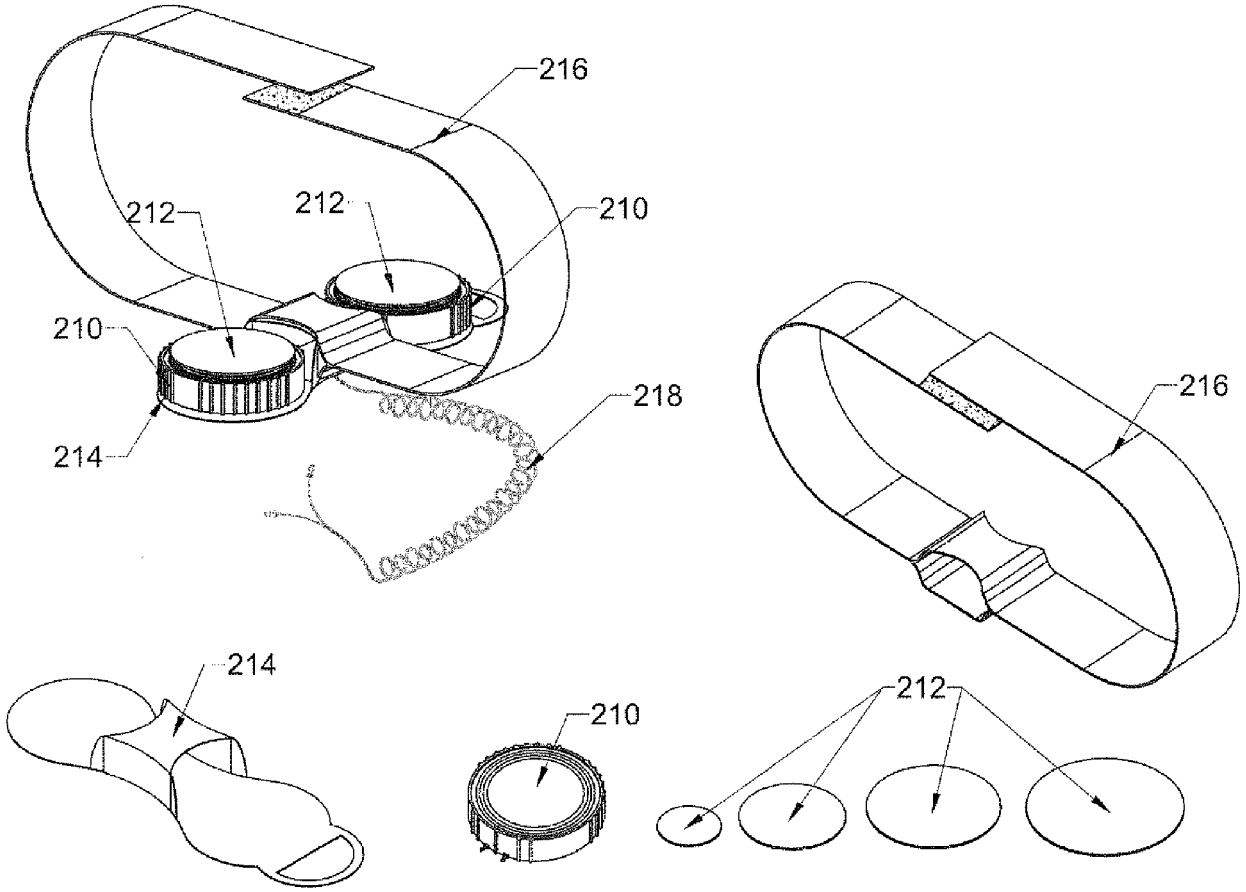

FIG.2

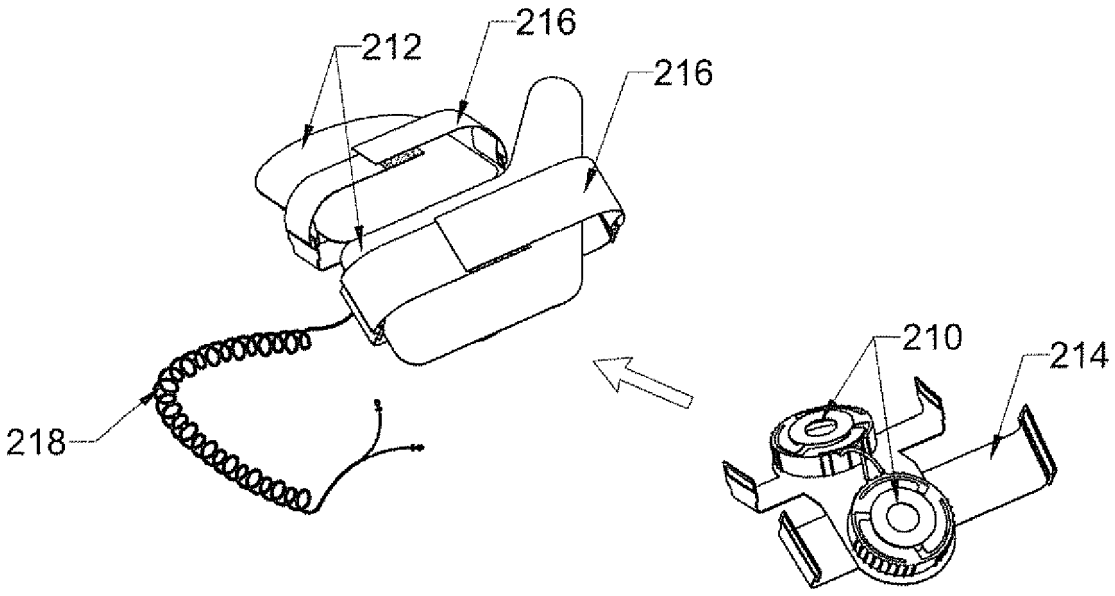

FIG. 3

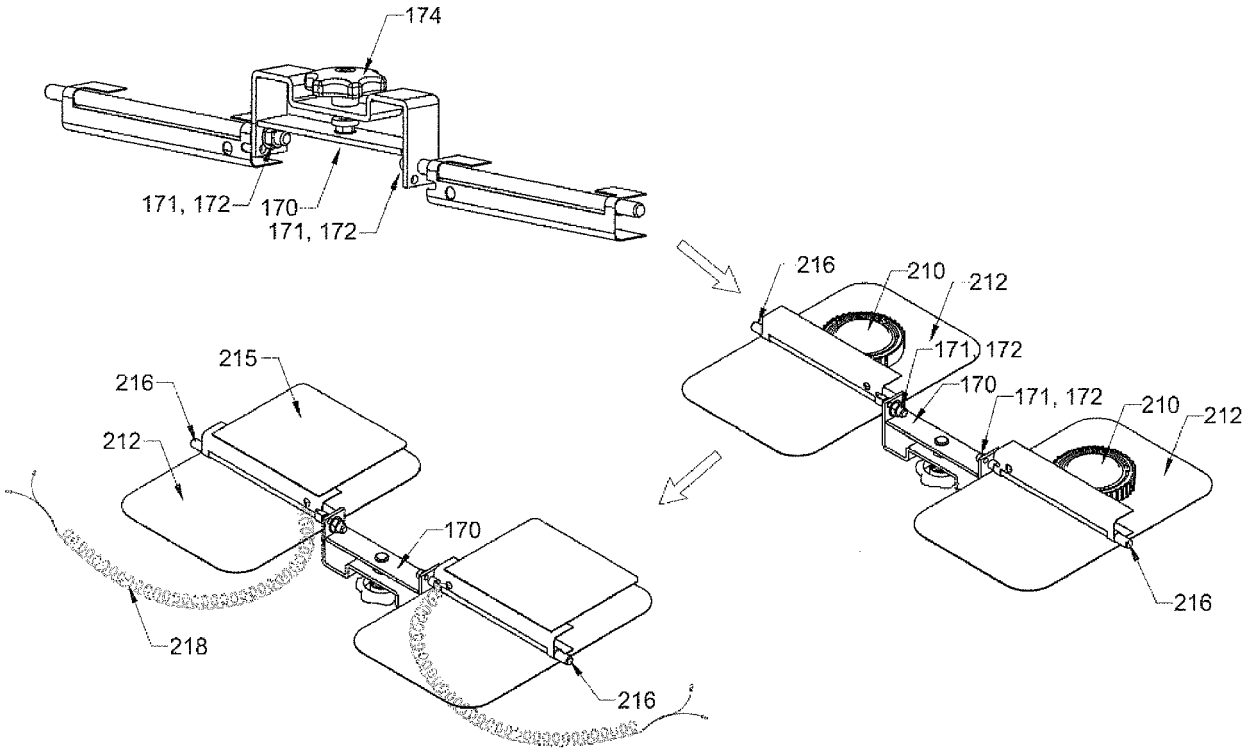
174
171, 172
170
171, 172
216
210
212
171, 172
170
171, 172
210
212
216
215
216
212
170
218
216

FIG. 4

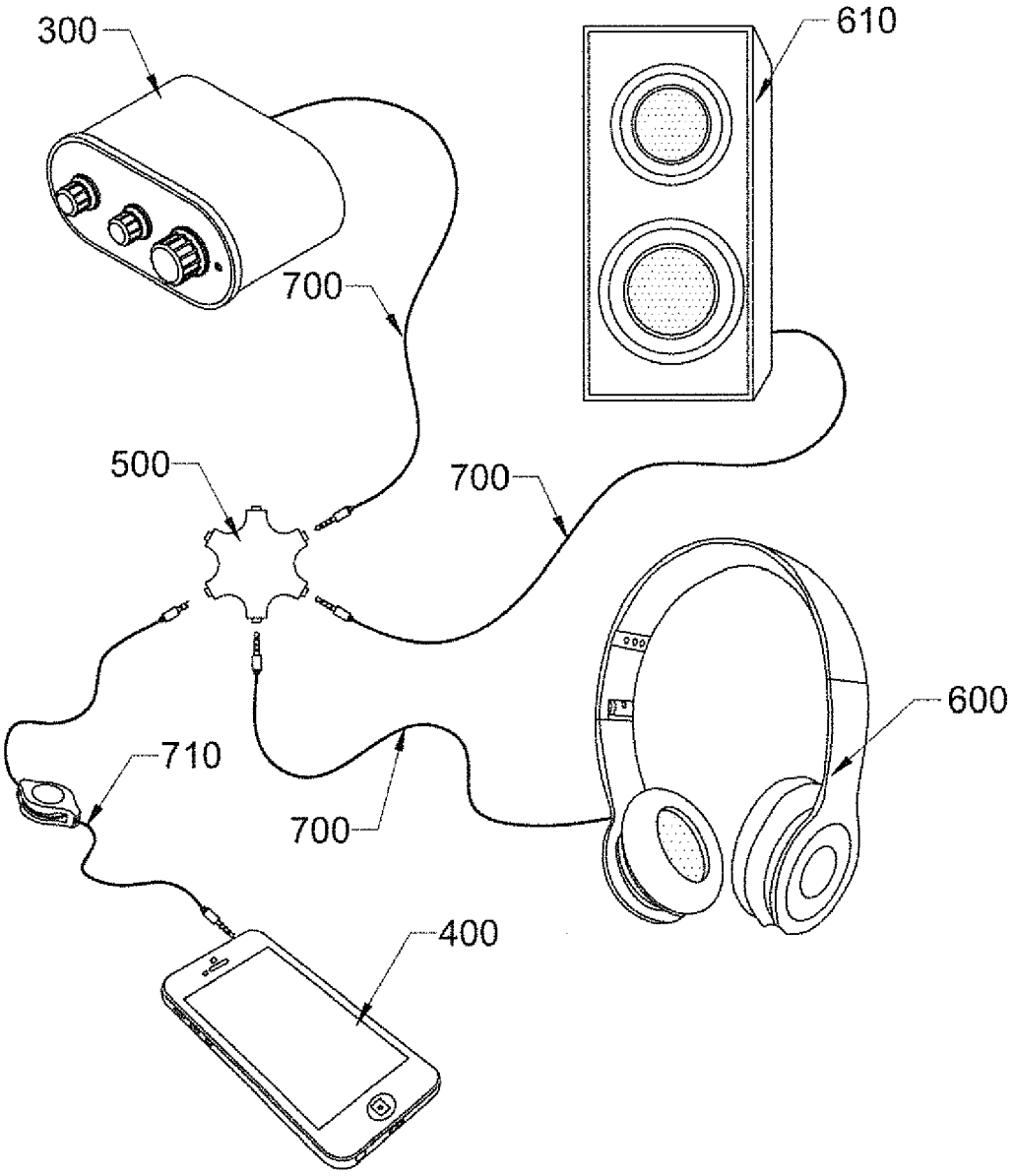

FIG. 5

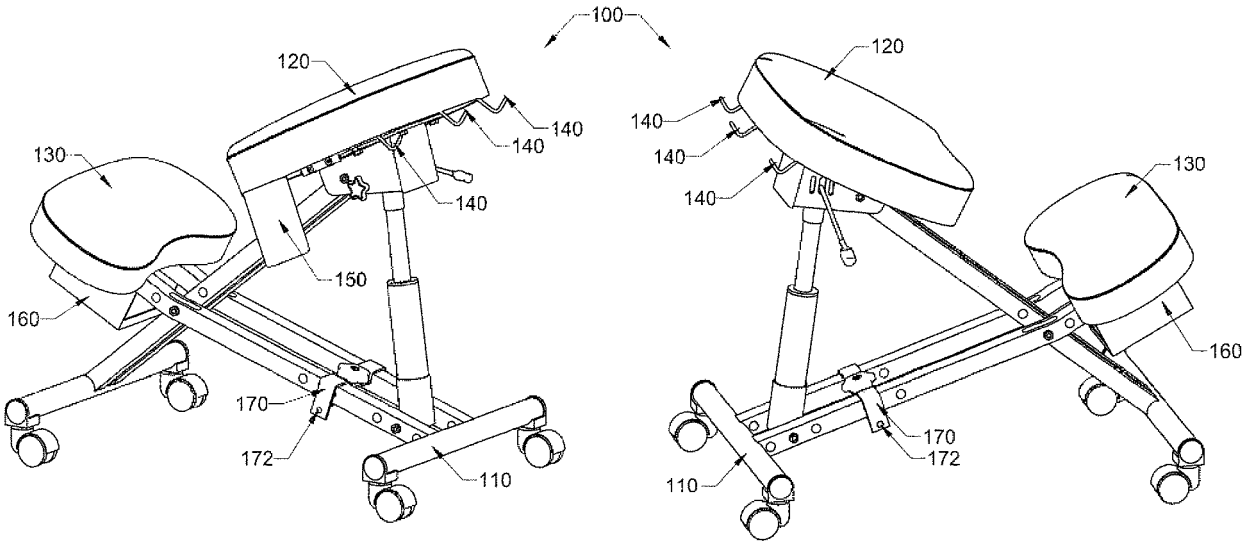
100
120
140
140
140
130
150
160
170
172
110
120
140
140
140
130
160
170
172
110

FIG. 6

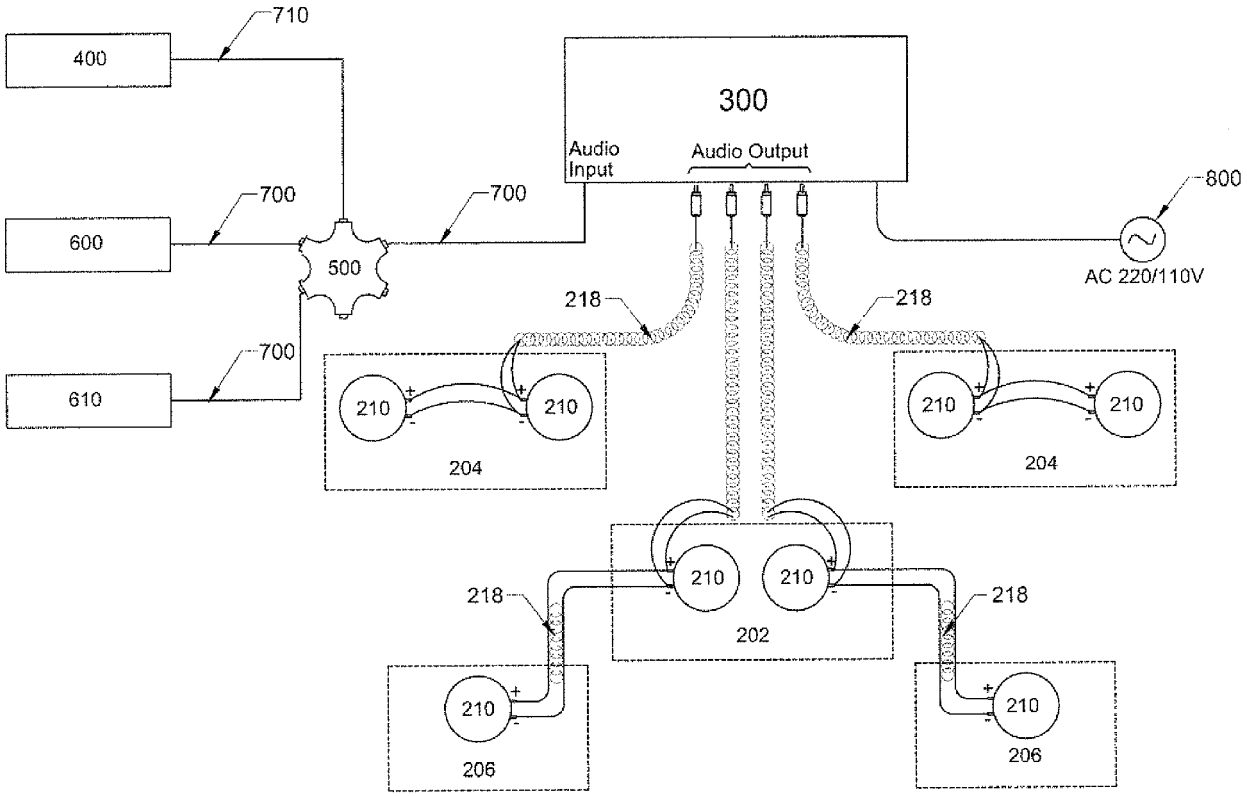
400
710
600
700
610
700
500
700
300
Audio Input
Audio Output
800
AC 220/110V
218
218
210
210
204
210
210
204
210
210
202
218
218
210
206
210
206

FIG. 7

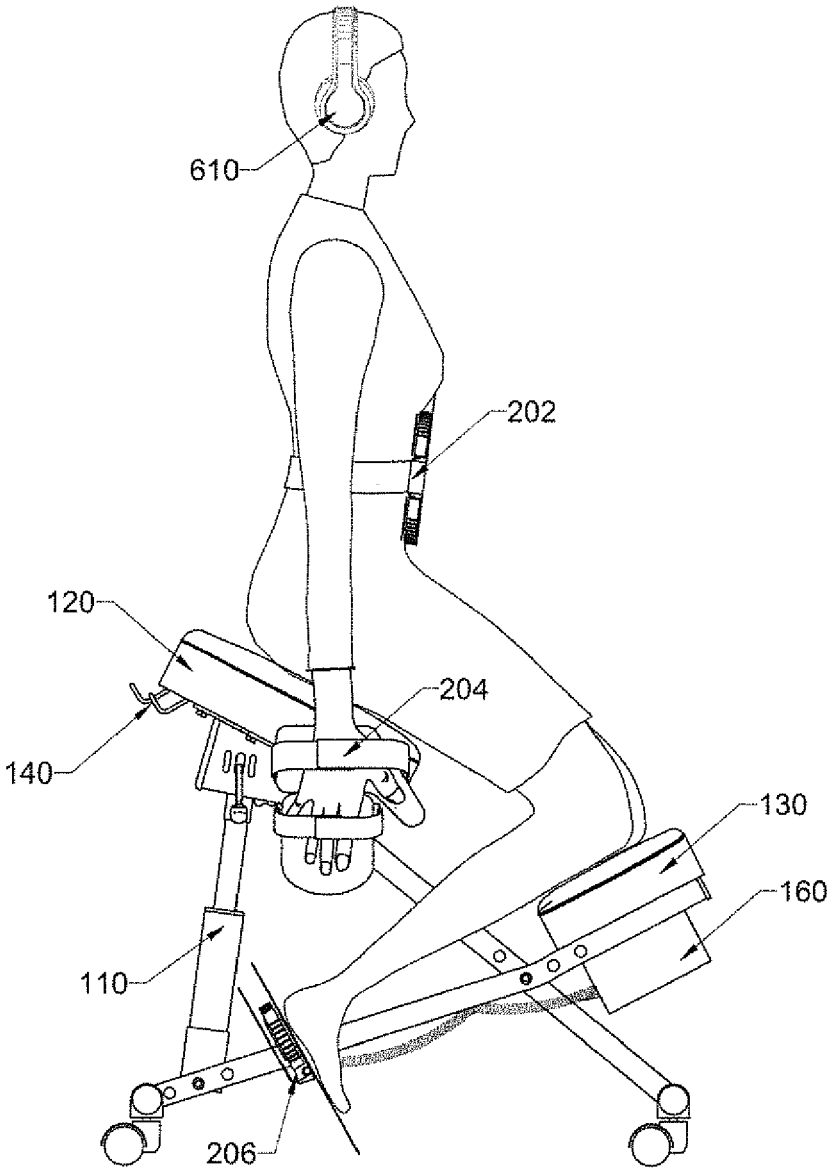

FIG. 8

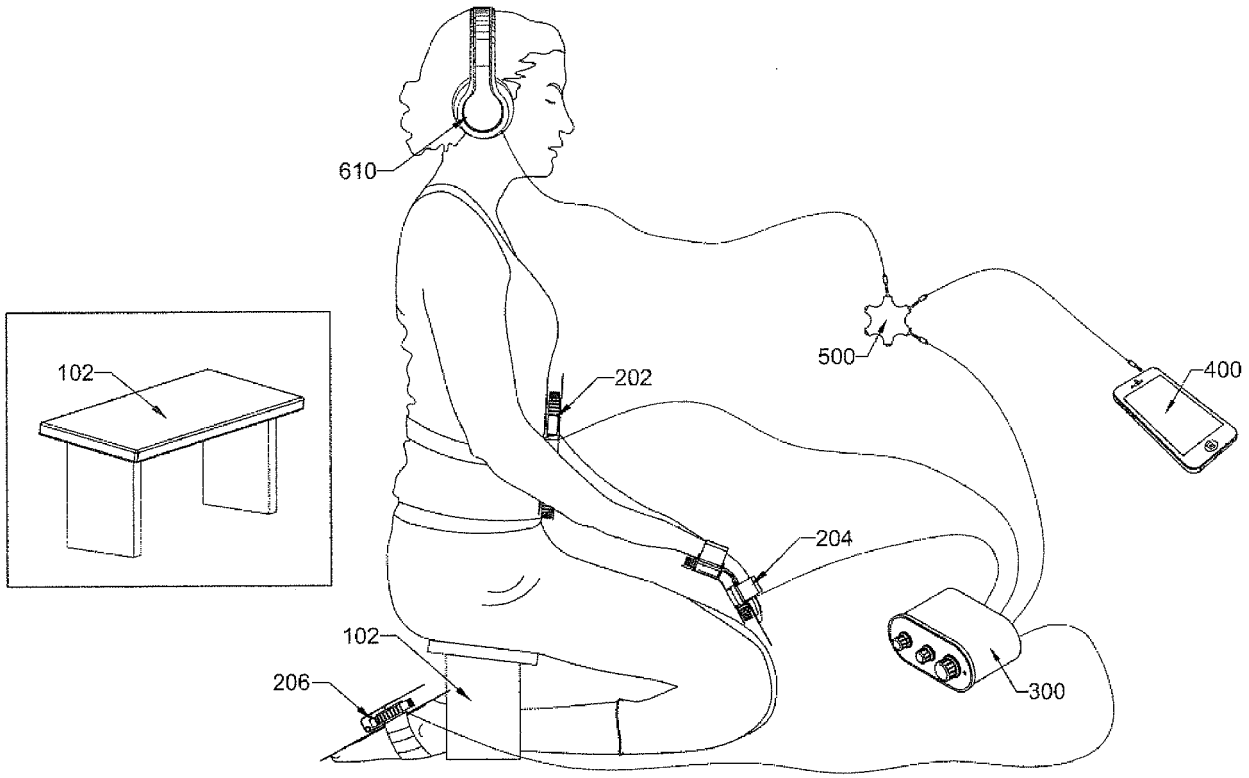

FIG. 9

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 16 20 2579

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2015/144185 A1 (AMAGER HOSPITAL [DK]) 1 October 2015 (2015-10-01) * pages 5-15; figures *	1-15	INV. A61H23/02 H04R5/02 H04R5/04
X	EP 0 787 476 A2 (SOKO CO LTD [JP]) 6 August 1997 (1997-08-06) * columns 5-23; figures *	1,3,5-15	
X	WO 2007/103325 A2 (TACTILE SOUND SYSTEMS INC [US]; LEDONNE ROBERT D [US]) 13 September 2007 (2007-09-13) * pages 7-15; figures *	1,7-10, 13-15	
X	FR 2 307 424 A1 (BODYSONIC KK [JP]) 5 November 1976 (1976-11-05) * pages 3-6; figures *	1,7-10, 13-15	
X	WO 2006/048723 A1 (DELLA RAGIONE RICCARDO [IT]; GARZELLA ROBERTO [IT]) 11 May 2006 (2006-05-11) * pages 6-9; figures *	1,3, 5-10, 13-15	

TECHNICAL FIELDS SEARCHED (IPC)

A61H
H04R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 May 2017	Teissier, Sara

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 16 20 2579

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.

31-05-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015144185 A1	01-10-2015	AU 2015236924 A1	10-11-2016
		CA 2943833 A1	01-10-2015
		EP 3122308 A1	01-02-2017
		WO 2015144185 A1	01-10-2015
EP 0787476 A2	06-08-1997	AU 695594 B2	20-08-1998
		EP 0787476 A2	06-08-1997
		US 5895348 A	20-04-1999
WO 2007103325 A2	13-09-2007	US 2007217644 A1	20-09-2007
		WO 2007103325 A2	13-09-2007
FR 2307424 A1	05-11-1976	CA 1042812 A	21-11-1978
		DE 2614972 A1	21-10-1976
		FR 2307424 A1	05-11-1976
		GB 1530688 A	01-11-1978
		US 4064376 A	20-12-1977
WO 2006048723 A1	11-05-2006	EP 1827351 A1	05-09-2007
		WO 2006048723 A1	11-05-2006

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 4055170 A **[0003]**
- US 8638966 B2 **[0004]**
- US 20110251535 A1 **[0005]**
- US 5101810 A **[0006]**