

H04R

LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRANSDUCERS; DEAF-AID SETS; PUBLIC ADDRESS SYSTEMS (generating mechanical vibrations in general [B06B](#); transducers for measuring particular variables [G01](#); transducers in clocks [G04](#); producing sounds with frequency not determined by supply frequency [G10K](#); transducers in recording or reproducing heads [G11B](#); transducers in motors [H02](#))

Definition statement

This place covers:

- loudspeakers, microphones, acoustic transducers therefor producing acoustic waves or variations of electric current or voltage, or gramophone pick-ups
- arrangements actuated by variations of electric current or voltage for cutting grooves in records;
- circuits for the above-mentioned loudspeakers, microphones, acoustic transducers, gramophone pick-ups or arrangements;
- monitoring or testing of the above-mentioned loudspeakers, microphones, acoustic transducers, gramophone pick-ups, arrangements or circuits therefor.

Relationships with other classification places

Regarding producing sound, this subclass covers producing sound with a frequency determined by the frequency of the electrical signal applied to the transducer, whereas [G10K](#) covers producing sounds with frequency not so determined.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---|
| Generating mechanical vibrations in general | B06B |
| Transducers for measuring particular variables | G01H |
| Transducers in recording or reproducing heads | G11B |
| Transducers in motors | H02K , H02N |
| Transmission systems employing ultrasonic, sonic or infrasonic waves | H04B 11/00 |

Special rules of classification

- Classification of invention information and additional information is obligatory.
- Further detail not provided for in any of the main groups is provided for in the subgroups of Indexing Code groups [H04R 2201/00](#) - [H04R 2231/00](#), [H04R 2307/00](#) and [H04R 2400/00](#) – [H04R 2499/00](#). These indexing code groups should be used in combination with CPC main trunk symbols to classify information highly relevant to the invention only. Classification is obligatory as indicated for each of the indexing groups concerned.
- Of Indexing Code groups [H04R 2201/00](#) - [H04R 2231/00](#), [H04R 2307/00](#) and [H04R 2400/00](#) - [H04R 2499/00](#) and of Indexing Code groups [H04R 2201/02](#), [H04R 2201/10](#) and [H04R 2201/40](#) ONLY the subgroups should be used for classification.
- Further detail not provided for in any of the main groups is provided for in the subgroups of Indexing Code groups [H04S 2400/00](#) and [H04S 2420/00](#) below. Classification is obligatory.
- Modifications to the transducers itself (e.g. a Helmholtz resonator attached to a through-hole in the magnetic circuit or zeolytes attached to the frame) in order to modify the frequency response are

to be classified in the appropriate place for the type of transducer ([H04R 9/00](#) - [H04R 23/00](#)) as invention information in combination with [H04R 1/22](#) as additional information.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------------------------|---|
| Acoustic, Sound | cover the technical field dealing with ultrasonic, sonic or infrasonic waves |
| Deaf aid | hearing aid |
| Loudspeaker | transducer mounted in a casing for producing sound |
| Microphone | transducer mounted in a casing for collecting sound |
| Stereophonic system | two- or more channel system, e.g. quadraphonic, ambisonic or similar system |
| Transducer | a device that converts an electrical signal to an acoustic signal with a frequency which is determined by the frequency of the electrical signal applied to the transducer, or vice versa |
| Microstructural device | 1. micromechanical devices comprising movable, flexible or deformable elements; 2. three-dimensional structures without movable, flexible or deformable elements, comprising microformations designed to accomplish an essential structural function for interacting with their environment, as opposed to purely electronic or chemical functions, regardless of whether the structures are combined with microelectronic devices or formed from specific materials; |
| Microstructural system | 1. systems of cooperating microstructural devices; 2. microelectro-mechanical or microopto-mechanical systems, which combine on a common substrate the specific features of microstructural devices and electrical or optical components, e.g. for controlling, analysing or signalling the functioning of microstructural devices. |

H04R 1/00

Details of transducers, {loudspeakers or microphones}

Definition statement

This place covers:

Details of transducers, loudspeakers or microphones.

References

Limiting references

This place does not cover:

| | |
|--|--|
| Diaphragms for acoustic transducers | H04R 7/00 |
| Details of transducers characterised by the nature of the transducer | H04R 9/00 - H04R 23/00 |

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|---------------------------|
| Mountings specially adapted for telephone equipment | H04M 1/02 |
|---|---------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Mounting radio sets or communication systems in helmets | A42B 3/30 |
|---|---------------------------|

Special rules of classification

Further detail is covered by the Indexing Code group [H04R 2201/003](#) listed below. Classification is obligatory.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------------------|--|
| Casing | housing, cabinet, enclosure |
| Deaf aid | hearing aid, auditory prosthesis |
| Stereophonic system | two- or more channel system, e.g. quadraphonic, ambisonic or similar systems |

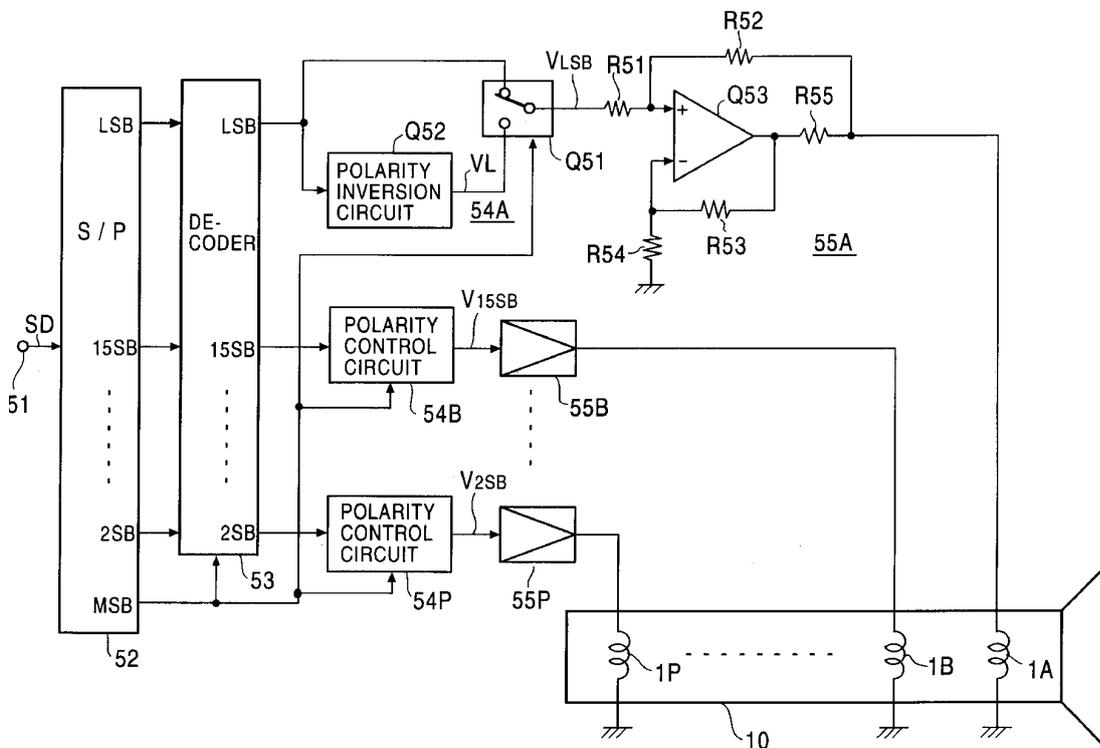
H04R 1/005

{using digitally weighted transducing elements}

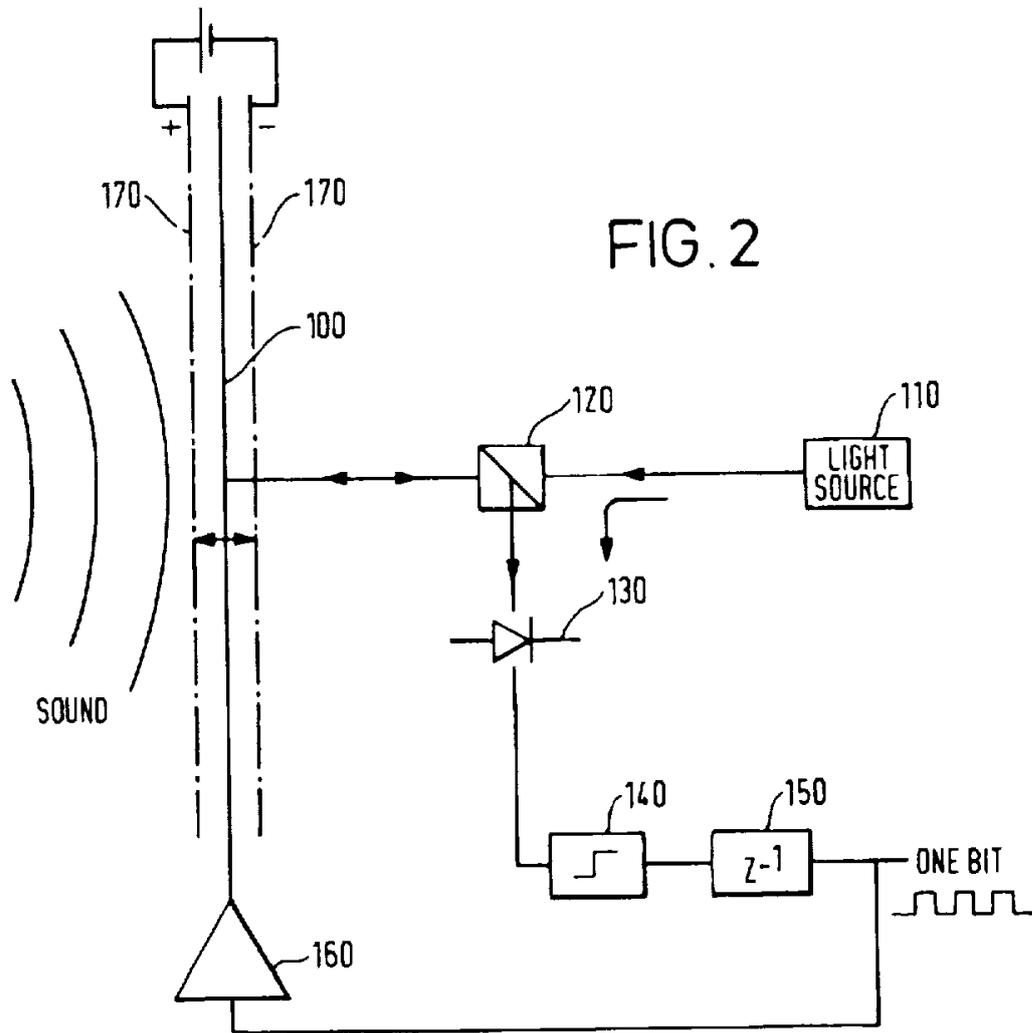
Definition statement

This place covers:

Example for a loudspeaker transducer (the number of windings of the 15 coils ranges from 2^0 - 2^{14})



Example for a microphone transducer:



H04R 1/02

Casings; Cabinets {; Supports therefor;} Mountings therein ([H04R 1/28](#) takes precedence {; attachments for microphones [H04R 1/08](#); mounting of transducers in earpieces [H04R 1/1075](#)})

Definition statement

This place covers:

Casings, cabinets for transducers, their manufacture, their support, or mountings for transducers therein.

References

Limiting references

This place does not cover:

| | |
|--------------------------------------|-----------------------------|
| Attachments for microphones | H04R 1/08 |
| Mounting of transducers in earpieces | H04R 1/1075 |

| | |
|--|---------------------------|
| Transducer mountings or enclosures modified by provision of mechanical or acoustic impedances, e.g. resonator, damping means | H04R 1/28 |
|--|---------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Mounting of acoustic transducers in vehicles | B60R 11/0217 , B60R 11/0247 |
|--|--|

Special rules of classification

Further detail is covered by the subgroups of Indexing Code group [H04R 2201/02](#) listed below. Classification is obligatory.

H04R 1/023

{Screens for loudspeakers}

Definition statement

This place covers:

A mesh or grating covering the loudspeaker transducer or a sound path leading to the loudspeaker transducer

H04R 1/025

{Arrangements for fixing loudspeaker transducers, e.g. in a box, furniture}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Furniture aspects of radio, television | A47B 81/06 |
| Adaptations of chairs or stools for incorporating lamps, radio sets, bars, telephones, ventilation, heating or cooling arrangements or the like | A47C 7/72 |

H04R 1/026

{Supports for loudspeaker casings}

Definition statement

This place covers:

Means to hold a loudspeaker casing for and during use

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---|
| Decoupling of vibrations by means of point-of-contact supports, e.g. ball bearings | F16F 15/021 |
| Supports and stands in general | F16M 11/00 ; F16M 13/00 |

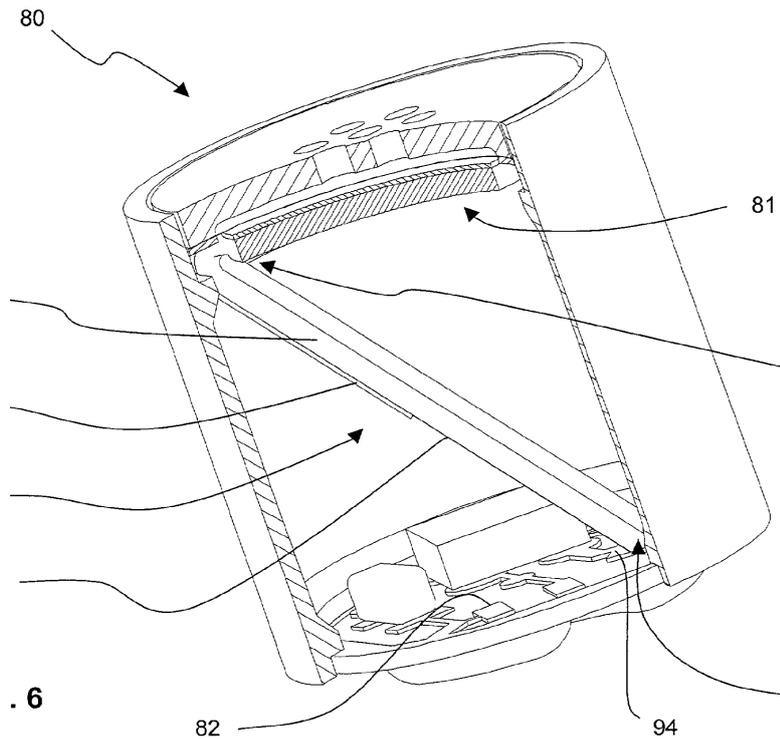
H04R 1/04

Structural association of microphone with electric circuitry therefor (in deaf-aid sets [H04R 25/00](#))

Definition statement

This place covers:

As shown in the figure circuitry (81) can be mounted inside the microphone (80)



References

Limiting references

This place does not cover:

| | |
|--|----------------------------|
| Structural association of microphone with electric circuitry therefor in deaf-aid sets | H04R 25/00 |
|--|----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| MEMS packages | B81B 7/0032 |
| Microstructural systems comprising a MEMS connected to control electronics, i.e. smart-MEMS | B81B 2207/01 |
| Packaging of Smart-MEMS, i.e. packaging together processing unit and MEMS | B81C 1/0023 |

H04R 1/06

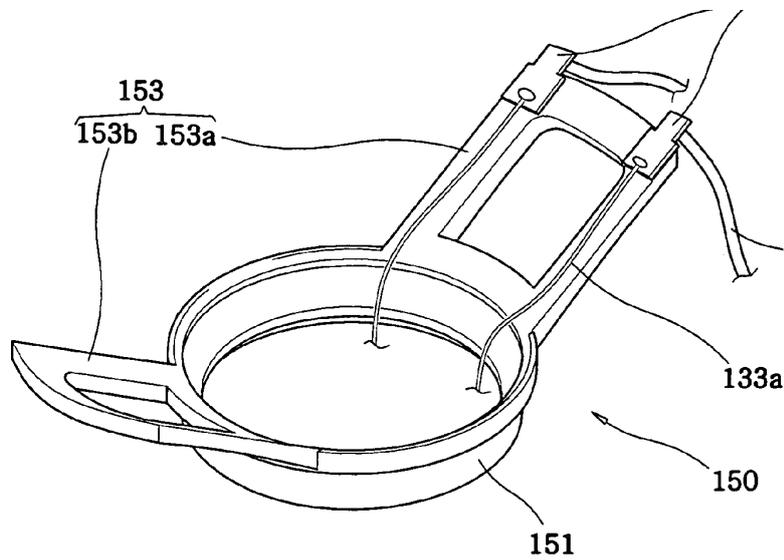
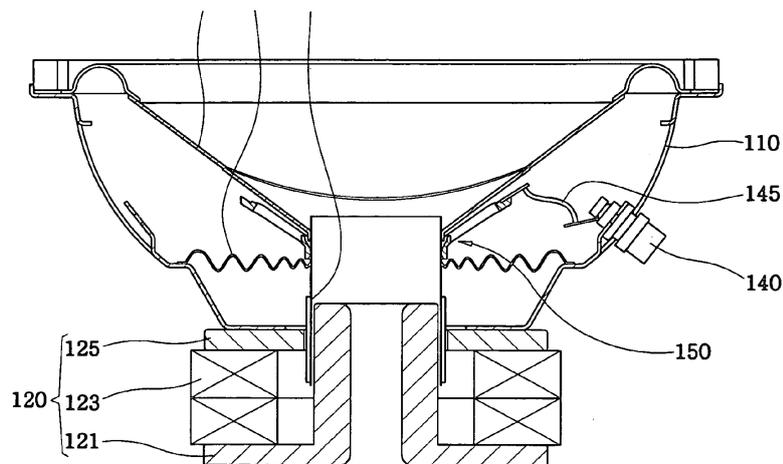
Arranging circuit leads; Relieving strain on circuit leads

Definition statement

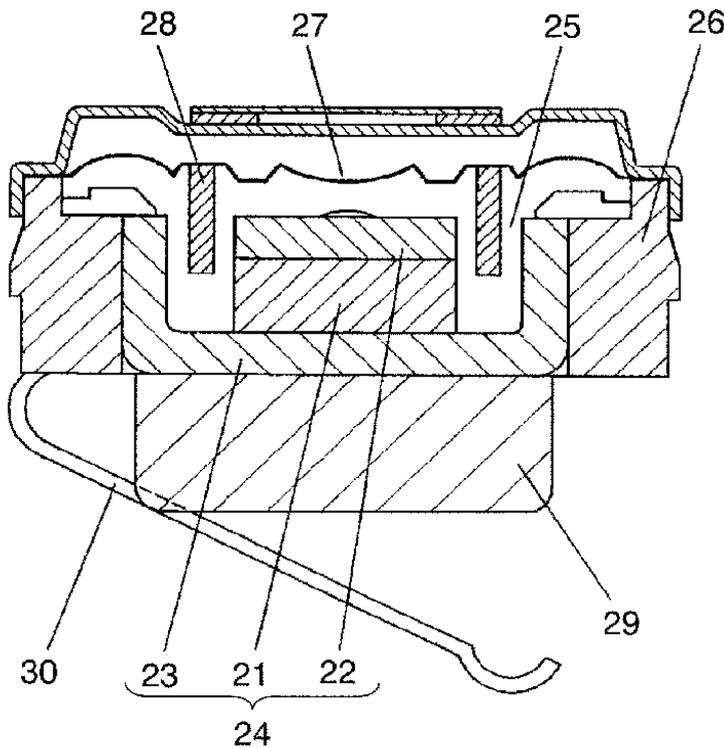
This place covers:

Connection or contacting arrangements specially adapted to transducers, loudspeakers or headphones.

In the example the tinsel wire 145 is prevented from contacting the diaphragm during vibration, by ring structure 150.



In the example, the terminal 30 is prevented from bending too much during mounting, by stopper 29.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---|
| Interconnections between the MEMS and external electrical signals | B81B 7/007 |
| Connecting electric signal lines from the MEMS device with external electrical signal lines, e.g. through vias | B81C 1/00301 |
| Means for relieving strain on wire connection, e.g. cord grip, for avoiding loosening of connections between wires and terminals within a coupling device terminating a cable or for flat or ribbon cables | H01R 13/58 , H01R 12/00 |

Special rules of classification

Further detail is covered by the subgroup of Indexing Code group [H04R 2420/09](#) listed below. Classification is obligatory.

H04R 1/08

Mouthpieces; {Microphones;} Attachments therefor

Definition statement

This place covers:

Microphones, mouthpieces or attachments therefor, e.g. spiders or microphone booms, or protective screens therefor, e.g. all weather or wind screens.

References

Limiting references

This place does not cover:

| | |
|----------------------------------|---------------------------|
| Throat mountings for microphones | H04R 1/14 |
|----------------------------------|---------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------------------------|---|
| Supports and stands in general | F16M 11/00 ; F16M 13/00 |
|--------------------------------|---|

Synonyms and Keywords

In patent documents, the following words/expressions are often used with the meaning indicated:

| | |
|----------|--|
| "spider" | "shock mount to elastically fasten microphones to stands". |
|----------|--|

H04R 1/086

{Protective screens, e.g. all weather or wind screens}

Special rules of classification

Further detail is covered by the subgroup of Indexing Code group.

Further detail is covered by Indexing Code group [H04R 2410/07](#). Classification is obligatory.

H04R 1/10

Earpieces; Attachments therefor {; Earphones; Monophonic headphones ([H04R 1/28](#) takes precedence; stereophonic headphones [H04R 5/033](#))}

Definition statement

This place covers:

- Earphones or monophonic headphones;
- Attachments therefor, e.g. ear hooks;
- Details of headphones both of monophonic and stereophonic type, e.g. earpieces, e.g. intra-aural or supra-aural, or mechanical or electronic switches or control elements peculiar thereto, or accumulators or arrangements for charging peculiar thereto;
- Assembly or manufacture thereof, e.g. ear pads;
- Mechanical or electrical reduction of external noise.

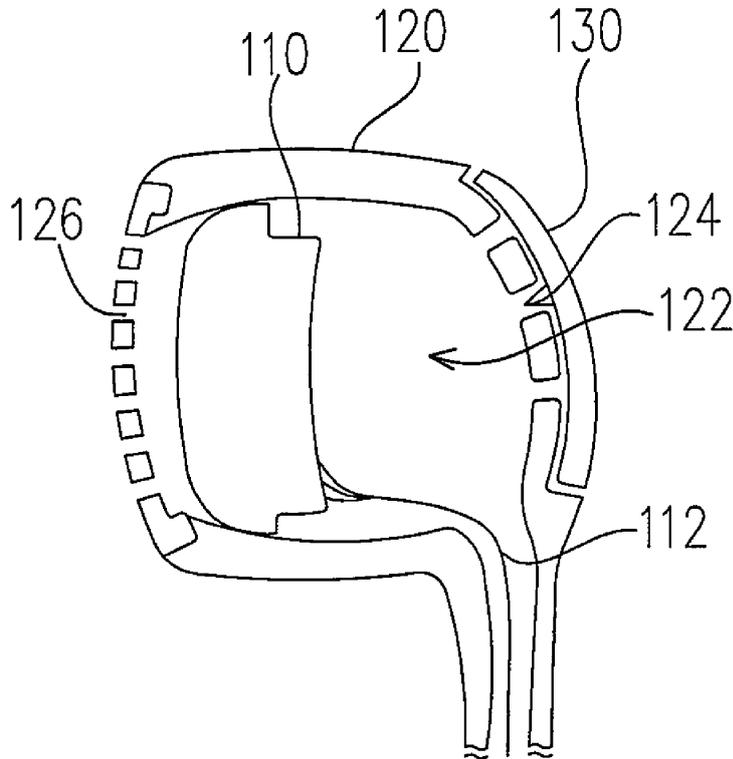
References

Limiting references

This place does not cover:

| | |
|--|---------------------------|
| Transducer mountings or enclosures modified by provision of mechanical or acoustic impedances, e.g. resonator, damping means | H04R 1/28 |
|--|---------------------------|

Example for the precedence rule:



Earphone wherein the frequency response can be changed by changing (with slide 130) the number of holes (124) that are open/closed

Invention information: [H04R 1/2826](#)

Additional information: [H04R 1/1016](#), [H04R 1/1041](#)

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Sanitary or hygienic devices for earpieces | H04R 1/12 |
| Badges | A44C 3/00 |
| Ornaments for ears | A44C 7/00 |
| Earphones measuring physiological sounds (e.g. heart rate, breathing, pulse) | A61B 5/02 |
| Transceivers carried on the body, e.g. in helmets | H04B 1/385 |

Special rules of classification

- When classifying in this group or in its subgroups, aspects relating to stereophonic headphones are to be classified in [H04R 5/033](#) (additional information) as well.
- Concerning inventions relating to hearing devices, if an application describes and shows the invention using only embodiments relating to ear- or headphones then [H04R 1/10](#) or subgroups or [H04R 5/033](#) or subgroups should be given as invention information. Dependent on the case, the mere statement that the invention is also applicable to hearing aids may render classification under [H04R 25/00](#) useful, but only as additional information. Only if specific non-trivial embodiments for

hearing aids are also shown, classification under [H04R 25/00](#) as invention information may be considered as well.

H04R 1/1016

{Earpieces of the intra-aural type}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|-------------------------------------|-----------------------------|
| Ear moulds for hearing aids | H04R 25/652 |
| Hybrid ear moulds for customisation | H04R 25/659 |
| Earplugs for protection | A61F 11/08 |

Special rules of classification

Further detail is covered by the subgroups of Indexing Code group [H04R 2460/09](#) and [H04R 2460/11](#) listed below. Classification is obligatory.

H04R 1/1025

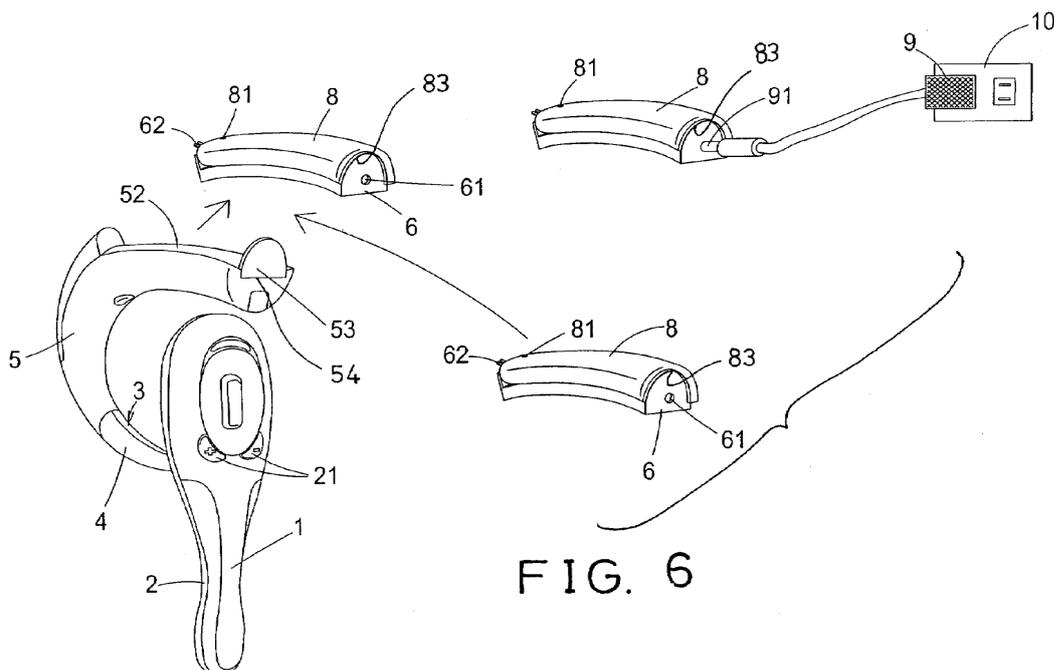
{Accumulators or arrangements for charging (secondary cells per se [H01M 10/00](#); charging in general [H02J 7/00](#))}

Definition statement

This place covers:

Adaptations to earpieces to enable charging.

For example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Aspects of accumulators, e.g. rechargeable batteries, fuel cells, in hearing aids | H04R 2225/31 |
| Secondary cells per se | H01M 10/00 |
| Charging in general | H02J 7/00 |
| Battery chargers characterised by the mechanical construction, e.g. adapted for holding portable devices containing batteries | H02J 7/0042 |

H04R 1/1033

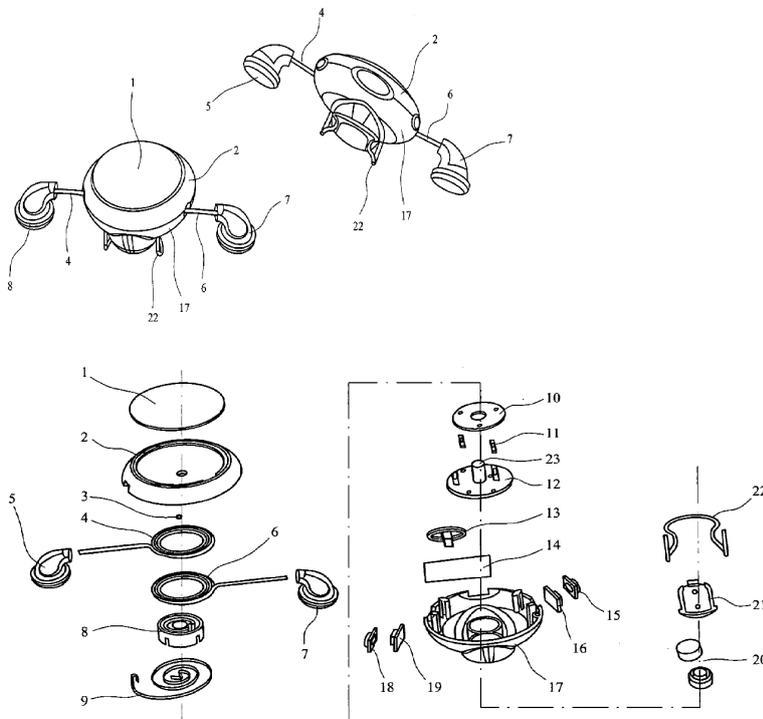
{Cables or cables storage, e.g. cable reels (cord reels per se [H02G 11/02](#); arrangements for storing and repeatedly paying-out and re-storing lengths of conductors or cables [B65H 75/34](#); extensible conductors or cables, e.g. self-coiling cords [H01B 7/06](#))}

Definition statement

This place covers:

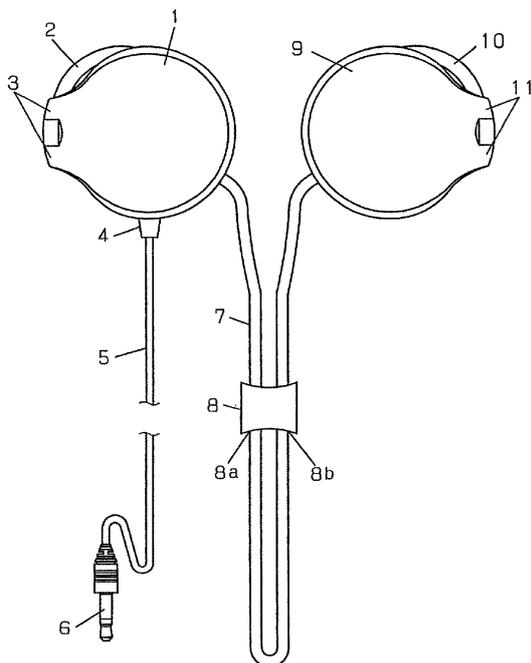
For example:

A stereophonic earphone with two earpieces each with a cable (4,5). The cable is wound on a spool (8) for storing the cables when the earphone is not in use.



For example:

A stereophonic headphone with a U-shaped slider (8) to adjust the length of the cable.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Arrangements for storing and repeatedly paying-out and re-storing lengths of conductors or cables | B65H 75/34 |
| Extensible conductors or cables, e.g. self-coiling cords | H01B 7/06 |
| Insulated conductors or cables characterised by their form with arrangements for facilitating mounting or securing | H01B 7/40 |
| Cord reels per se | H02G 11/02 |
| Protection of telephone cord; Guiding telephone cord; Winding-up telephone cord | H04M 1/15 |

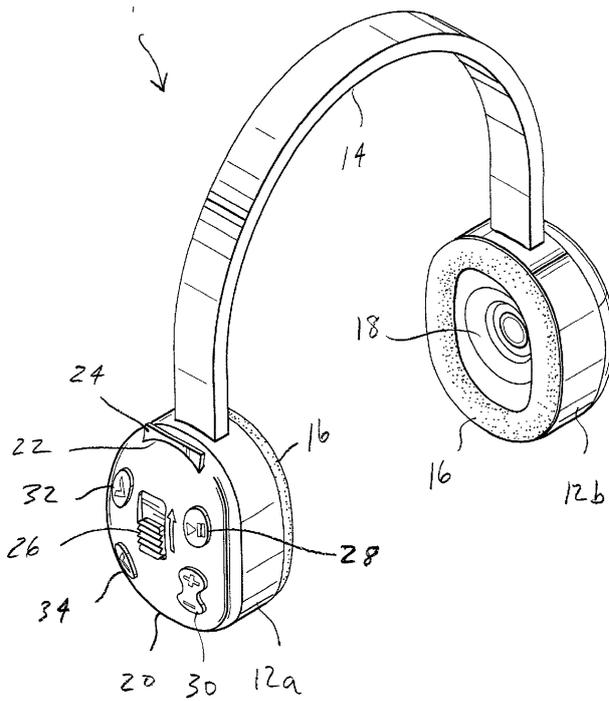
H04R 1/1041

{Mechanical or electronic switches, or control elements (switches in general [H01H](#))}

Definition statement

This place covers:

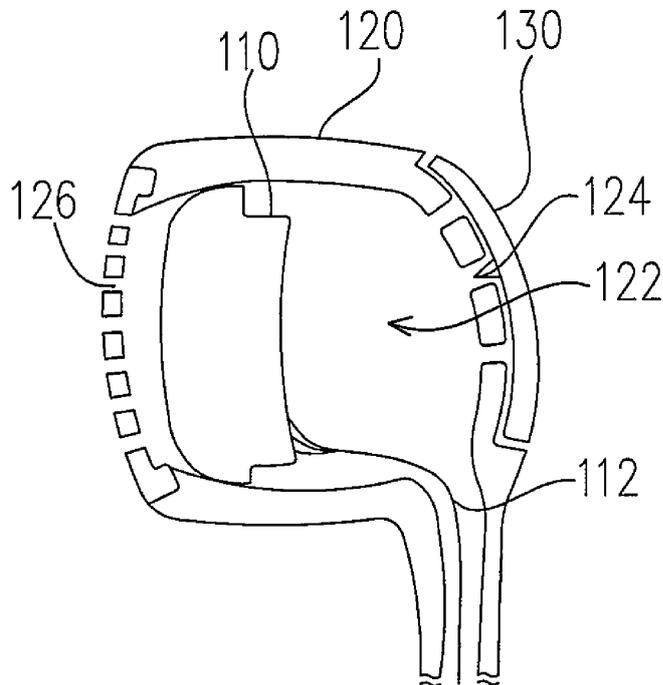
For example (electronic switch/control elements)



For example (mechanical control element):

Definition statement

Earphone wherein the frequency response can be changed by changing (with slide 130) the number of holes (124) that are open/closed. Please take note of precedence rule referring to [H04R 1/28](#).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Mounting or interconnection of switches or control elements in hearing aids | H04R 25/603 |
| Aspects relating to switches or control elements for hearing aids, e.g. functioning | H04R 2225/61 |
| Switches in general | H01H |
| Line cord switches | H01H 9/0228 |
| Hand-held casings specially adapted for remote control, e.g. of audio or video apparatus | H01H 9/0235 |

H04R 1/105

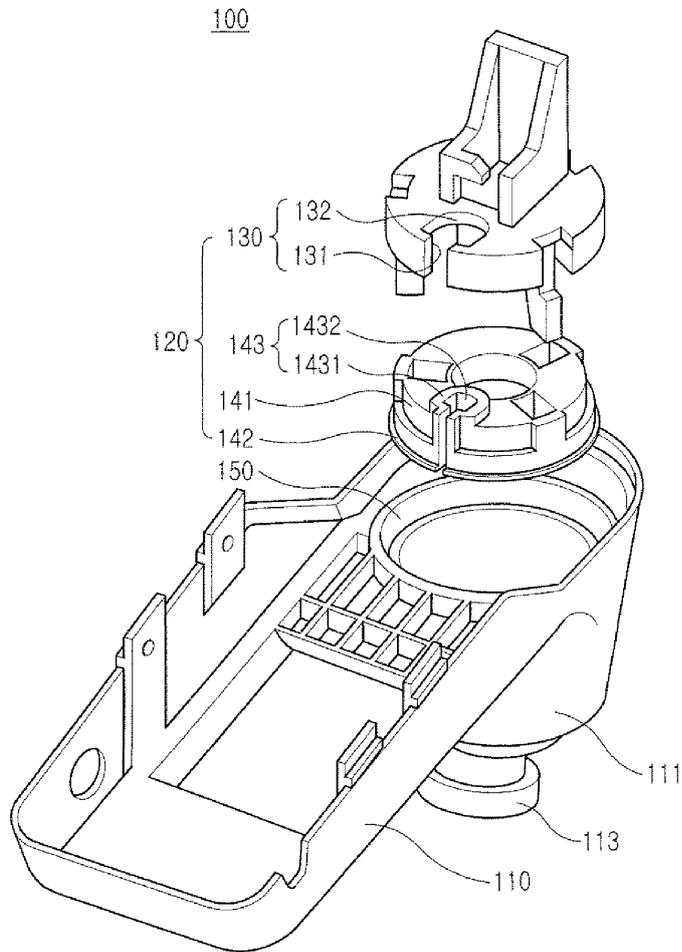
{Earpiece supports, e.g. ear hooks (for stereophonic headphones [H04R 5/0335](#))}

Definition statement

This place covers:

For example:

For example:



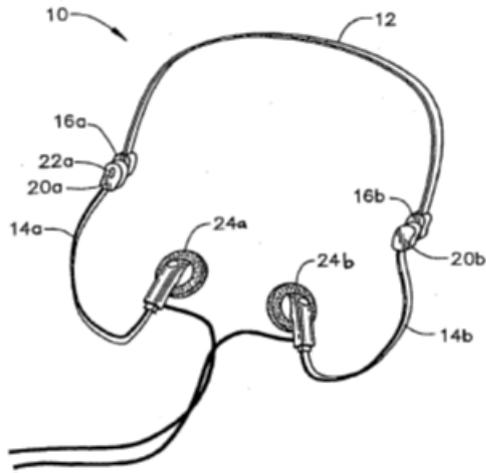
References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| Manufacture of mono- or stereophonic headphone parts not otherwise provided for in H04R , e.g. moulding of ear pads | H04R 2201/105 |
|---|-------------------------------|

Example (headband):



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Earpiece support for monophonic headphones | H04R 1/105 |
| Earpiece support for stereophonic headphones | H04R 5/0335 |

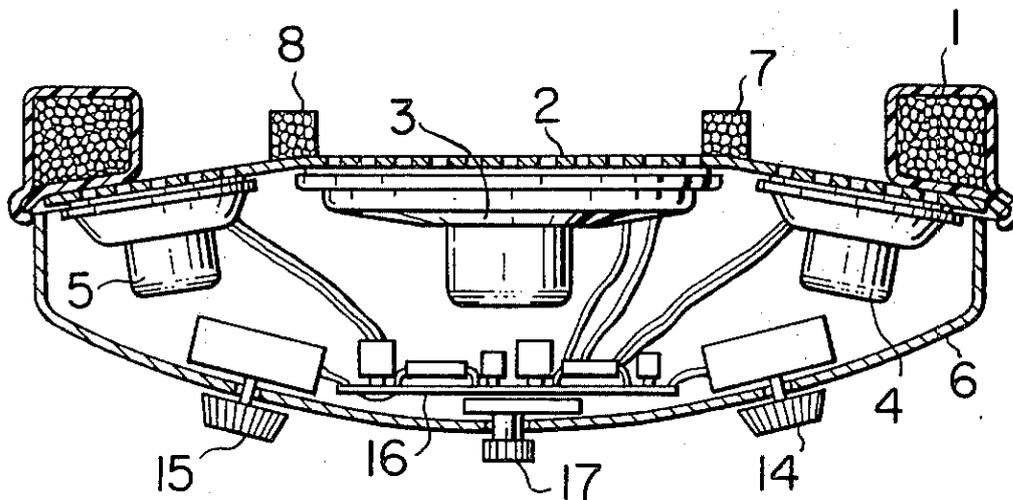
H04R 1/1075

{Mountings of transducers in earphones or headphones}

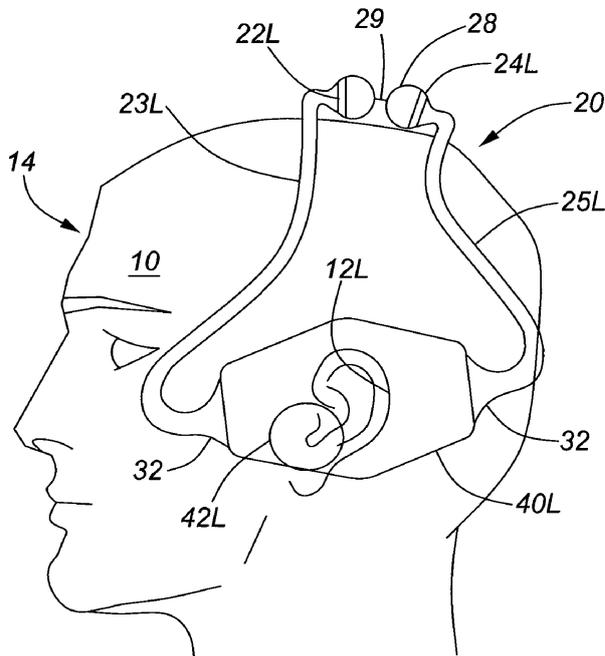
Definition statement

This place covers:

For example: (positioning of the transducers (4, 5, 6) in the earpiece)



For example: (mounting of the loudspeakers mounted on the head support (in figure only the left side: left front 22L and left rear 24L both ported to the left ear)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---------------------------------|---------------------------|
| Mounting transducers in general | H04R 1/02 |
|---------------------------------|---------------------------|

H04R 1/1083

{Reduction of ambient noise (active noise reduction per se [G10K 11/175](#); protective devices for the ear, e.g. providing acoustic protection [A61F 11/06](#))}

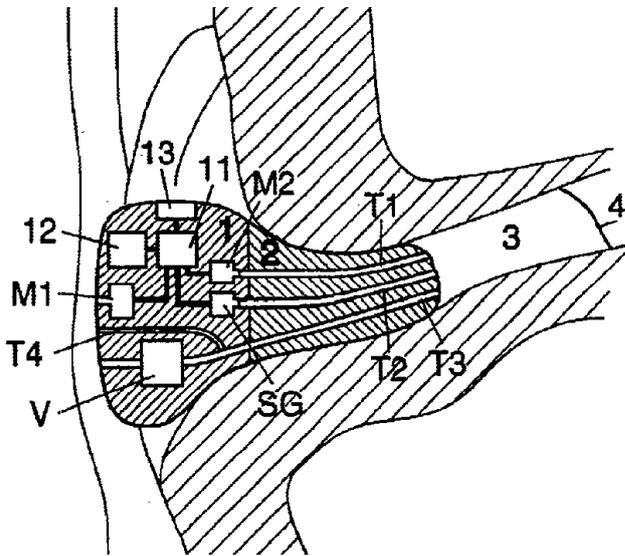
Definition statement

This place covers:

For example:

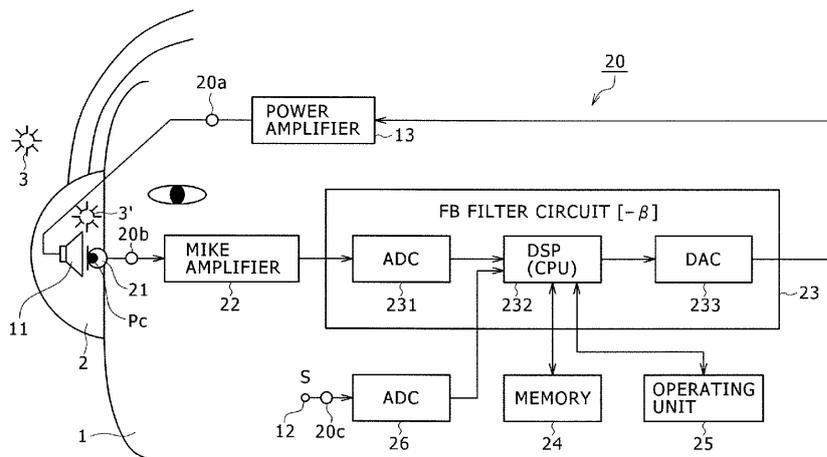
A personal noise exposure dose meter integrated in an active hearing protective communications earplug, comprising a main section 1 containing two microphones an outer microphone M1 and an inner microphone M2, and a sound generator SG, which are used for active noise control. A sealing section 2 is attached to the main section. An acoustic transmission channel T1 connects microphone M2 to the inner portion of the meatus 3. Microphone M2 therefore picks up the sound present in the meatus 3, just outside the eardrum (tympanum) 4. An acoustic transmission channel T2 connects

sound generator SG to the inner portion of the meatus 3. The sound generator SG may provide audible information to the user, in form of warning signals or synthetic speech.

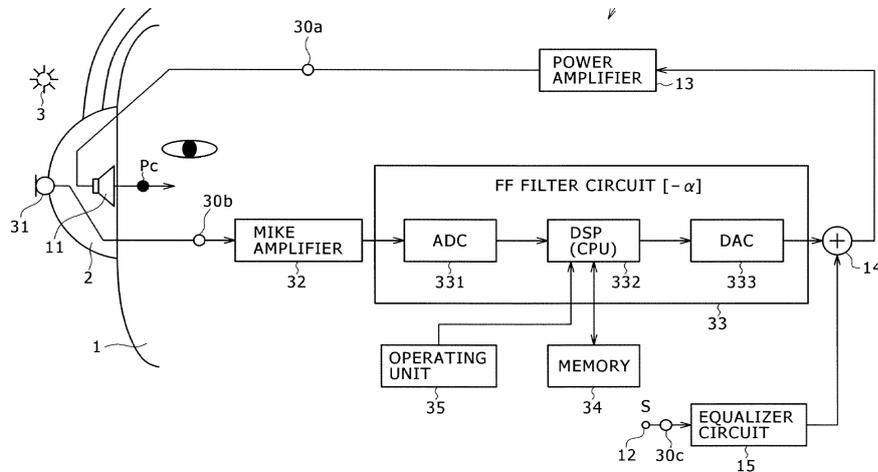


For example:

Noise reduction using feedback (23):



Noise reduction using feedforward (33).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Protective devices for the ear, e.g. providing acoustic protection | A61F 11/06 , A61F 11/145 |
| Active noise reduction per se | G10K 11/175 |
| Active noise control in general for microphones or earphones | G10K 2210/1081 , G10K 2210/1082 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2460/01](#). Classification is obligatory.

H04R 1/1091

{Details not provided for in groups [H04R 1/1008](#) - [H04R 1/1083](#)}

References

References out of a residual place

Examples of places in relation to which this place is residual:

| | |
|--|-----------------------------|
| Earpieces of the supra-aural or circum-aural type | H04R 1/1008 |
| Earpieces of the intra-aural type | H04R 1/1016 |
| Accumulators or arrangements for charging | H04R 1/1025 |
| Cables or cables storage, e.g. cable reels | H04R 1/1033 |
| Mechanical or electronic switches, or control elements | H04R 1/1041 |
| Earpiece supports, e.g. ear hooks | H04R 1/105 |
| Manufacture or assembly | H04R 1/1058 |
| Reduction of ambient noise | H04R 1/1083 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2201/103](#), [H04R 2201/105](#), [H04R 2201/107](#), [H04R 2201/109](#), [H04R 2420/07](#), [H04R 2420/09](#), [H04R 2460/03](#), [H04R 2460/05](#), [H04R 2460/07](#), [H04R 2460/13](#), [H04R 2460/15](#) and [H04R 2460/17](#). Classification is obligatory.

H04R 1/12

Sanitary or hygienic devices for mouthpieces or earpieces, e.g. for protecting against infection

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| Mouthpieces in general | H04R 1/08 |
| Earpieces in general | H04R 1/10 |
| Ear wax barrier for hearing aids | H04R 25/654 |
| Hygienic or sanitary devices on telephone equipment | H04M 1/17 |

H04R 1/14

Throat mountings for microphones

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Mouthpieces in general | H04R 1/08 |
| Special adaptations for use as contact microphones | H04R 1/46 |
| Transceivers carried on the body, e.g. in helmets | H04B 1/385 |

H04R 1/20

Arrangements for obtaining desired frequency or directional characteristics (for stereophonic purpose [H04R 5/00](#))

References

Limiting references

This place does not cover:

| | |
|---|---------------------------|
| Arrangements for obtaining desired frequency or directional characteristics for stereophonic purposes | H04R 5/00 |
|---|---------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Speech enhancement by processing of the speech signal | G10L 21/02 |
|---|----------------------------|

H04R 1/22

for obtaining desired frequency characteristic only {(circuit for combining transducers having different responses [H04R 3/00](#); for hearing aids [H04R 25/407](#))}

Definition statement

This place covers:

Arrangements where the focus lies in the way the desired frequency characteristic is obtained

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|----------------------------|
| Arrangements in hearing aids for obtaining desired frequency characteristic | H04R 25/48 |
|---|----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Circuits for combining transducers having different responses | H04R 3/00 |
|---|---------------------------|

Special rules of classification

If a directivity effect is also addressed classification in [H04R 1/32](#) or subgroups as additional information is required as well

H04R 1/28

Transducer mountings or enclosures modified by provision of mechanical or acoustic impedances, e.g. resonator, damping means {(combinations of transducers with horns, i.e. front-loaded horns [H04R 1/30](#))}

Definition statement

This place covers:

Transducer enclosure modified by provision of mechanical or acoustic impedances to achieve a desired frequency or phase response, e.g. enclosures:

- of the bass reflex type,
- of the bandpass type,
- using passive membranes,
- using acoustic labyrinths or transmission lines,
- using back-loaded horns.
- with adjustable volume
- Virtual enlargement by e.g. zeolytes.

Transducer mountings or enclosures modified to reduce undesired resonances, i.e. standing waves within enclosure, or of vibrations, i.e. of the enclosure itself, by e.g.:

- damping materials in the enclosure,
- enclosure stiffening structures,

Definition statement

- Helmholtz resonators,
- special mountings of transducers.

References

Limiting references

This place does not cover:

| | |
|---|---------------------------|
| Combinations of transducers with horns, i.e. front loaded horns | H04R 1/30 |
|---|---------------------------|

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|--|----------------------------|
| Transducer mounting in telephone equipment improving the acoustic characteristics by means of constructional features of the housing, e.g. ribs, walls, resonating chambers or cavities. | H04M 1/035 |
|--|----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Mountings for loudspeaker in general | H04R 1/025 |
| Mountings for microphones in general | H04R 1/08 |
| Circuits for combining transducers having different responses | H04R 3/00 |

Special rules of classification

Applications of the mountings or enclosures for loudspeaker transducers is to be classified in the appropriate subgroup with title "{for loudspeaker transducers}";

Further detail is covered by the subgroup of Indexing Code group [H04R 2201/029](#). Classification is obligatory.

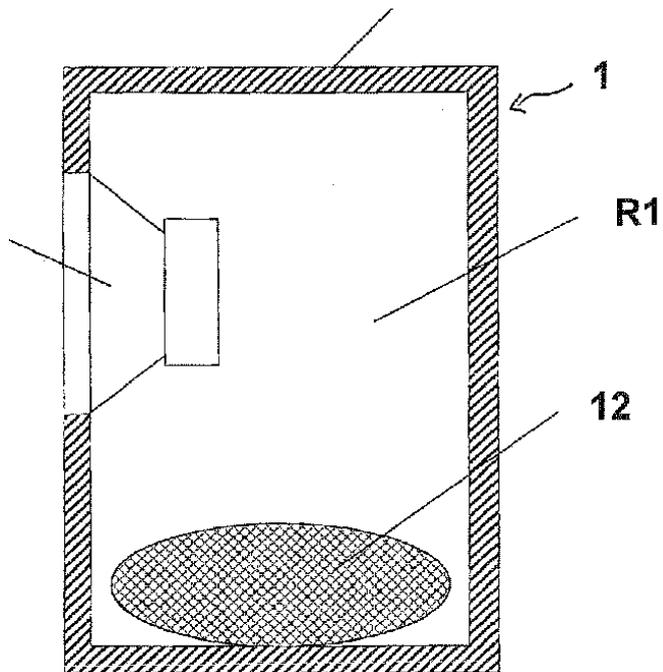
H04R 1/2803

{for loudspeaker transducers}

Definition statement

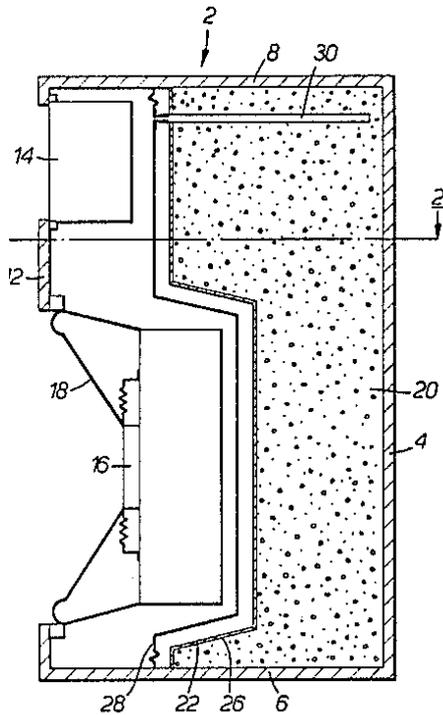
This place covers:

Example for porous material (12) for virtual volume increase, to improve bass response:



Definition statement

Example for porous carbon material (20) for virtual volume increase, to improve bass response, membrane (22) is to prevent moisture from reaching the porous carbon material; membrane acoustically transparent)

**Special rules of classification**

The use of porous materials in loudspeaker enclosures for equivalent volume increase is classified under [H04R 1/2803](#). For mid- and high-frequencies the porous material works as a damping material too. Thus classification in [H04R 1/2876](#) or Indexing Code may be required if this aspect is addressed as well.

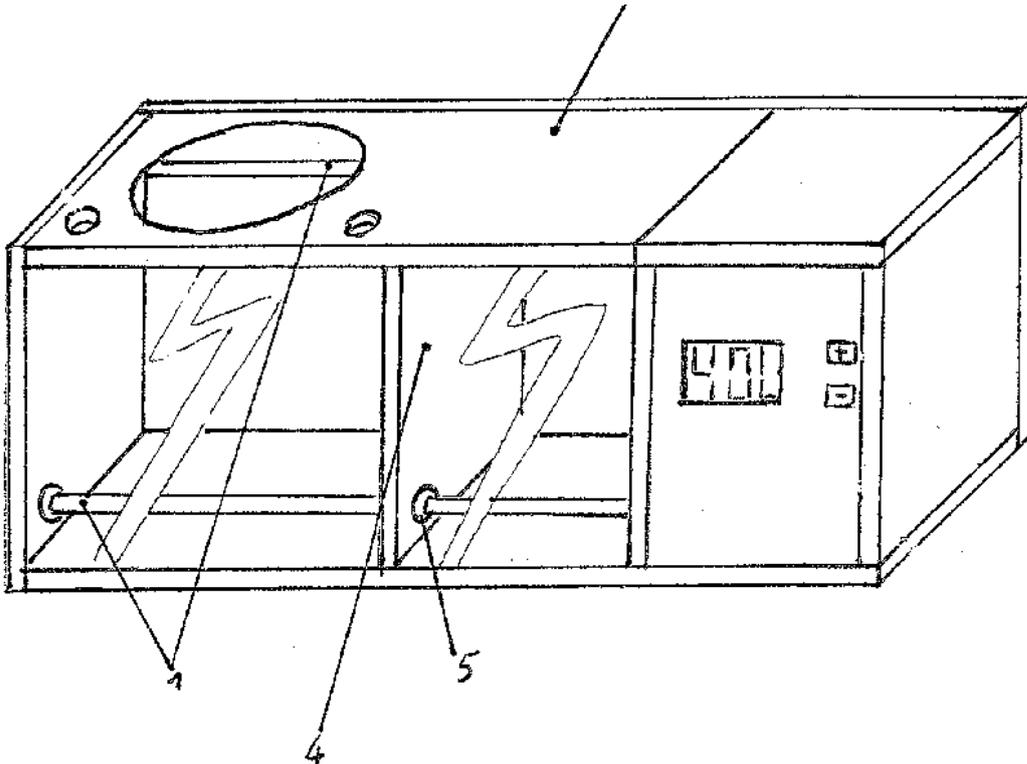
H04R 1/2807

{Enclosures comprising vibrating or resonating arrangements (for the reduction of undesired resonances or vibrations [H04R 1/2869](#))}

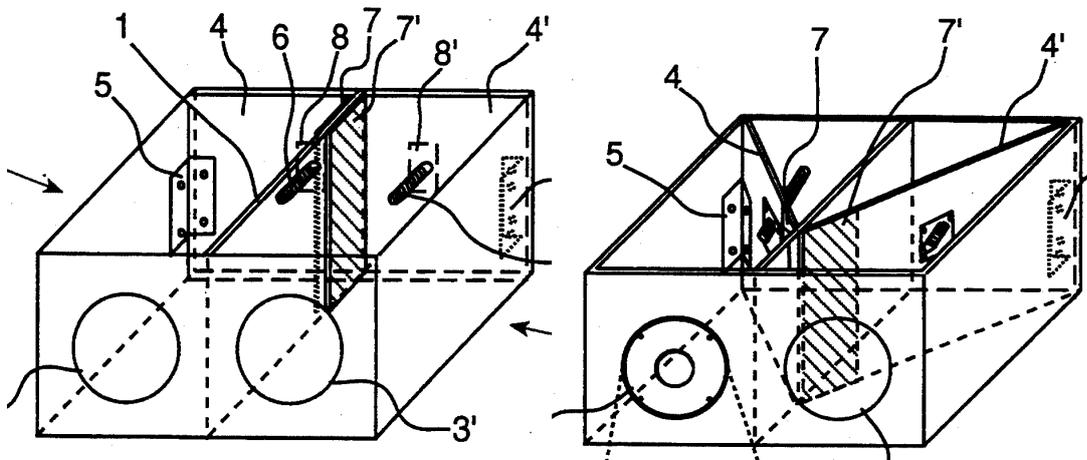
Definition statement

This place covers:

Example (for [H04R 1/2811](#)): movable side wall (4) for varying volume to adapt frequency response:



Example (for [H04R 1/2811](#)): left-hand figure amplified bass, and right-hand figure normal bass:



H04R 1/2823

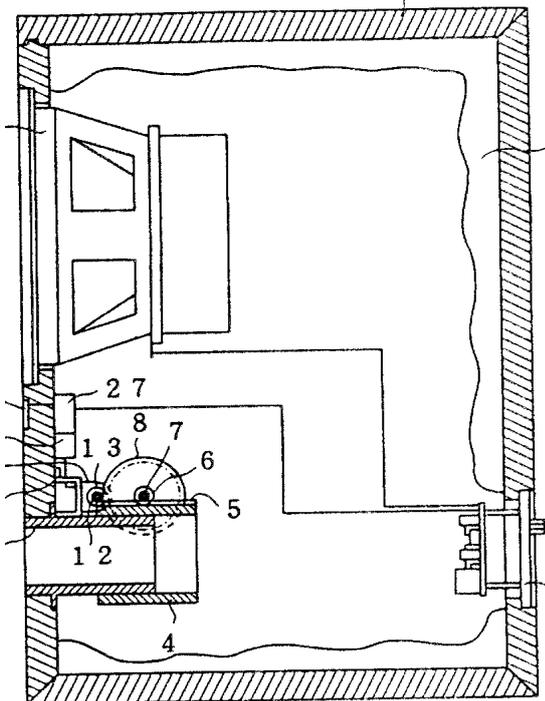
{Vents, i.e. ports, e.g. shape thereof or tuning thereof with damping material (number or position of ports [H04R 1/2815](#); vents in bandpass type enclosures [H04R 1/2846](#))}

Definition statement

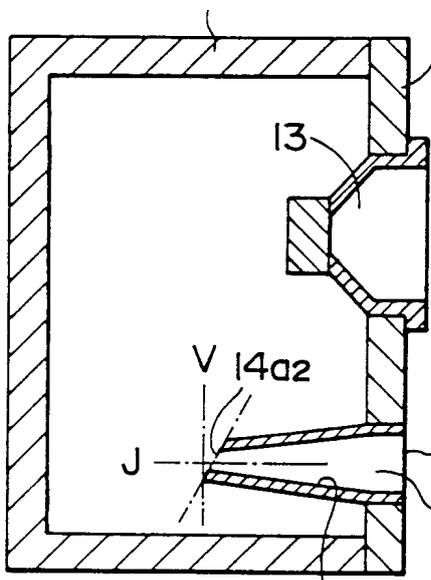
This place covers:

Examples (for [H04R 1/2826](#)):

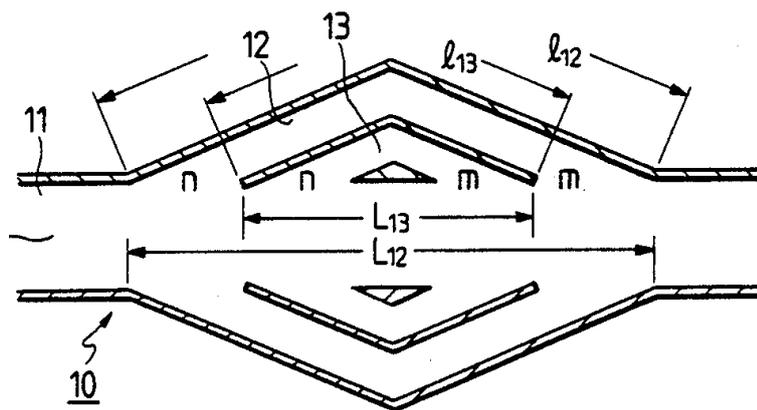
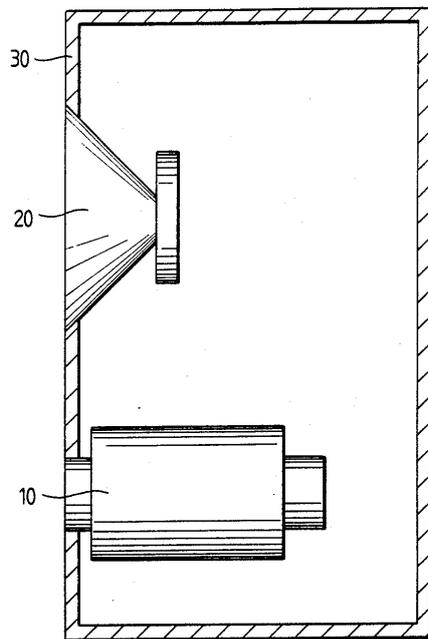
Vent with variable length:



Shape of the vent:



Shape and structure of the vent



References

Limiting references

This place does not cover:

| | |
|---|-----------------------------|
| Number or position of ports in enclosures of the bass reflex type | H04R 1/2815 |
|---|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|-----------------------------------|-----------------------------|
| Vents in bandpass type enclosures | H04R 1/2846 |
|-----------------------------------|-----------------------------|

H04R 1/283

{using a passive diaphragm}

Special rules of classification

- Passive diaphragms or their suspension (invention) and being used in a bandpass type enclosure is classified in in [H04R 1/283](#) or [H04R 1/2834](#) (invention information), but [H04R 1/2838](#) or [H04R 1/2842](#) (additional information) is to be given as well;
- Passive diaphragms or their suspension themselves are to be classified as diaphragms for transducers, i.e. in [H04R 7/00](#) or [H04R 31/003](#) (invention or additional information) where appropriate, but [H04R 1/283](#) or [H04R 1/2834](#) (additional information) is to be given as well.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|-------------------|---|
| Passive diaphragm | Diaphragm driven by a fluid and providing an acoustic impedance |
|-------------------|---|

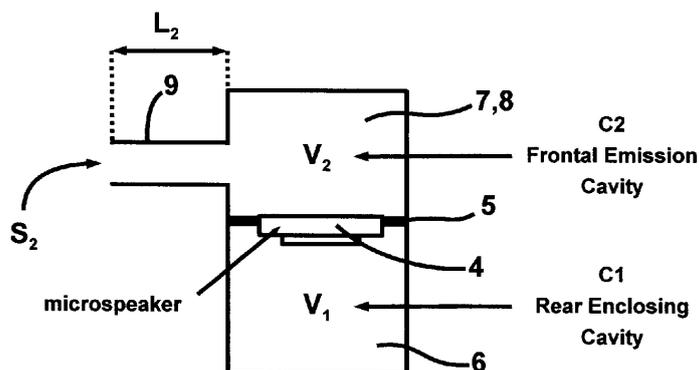
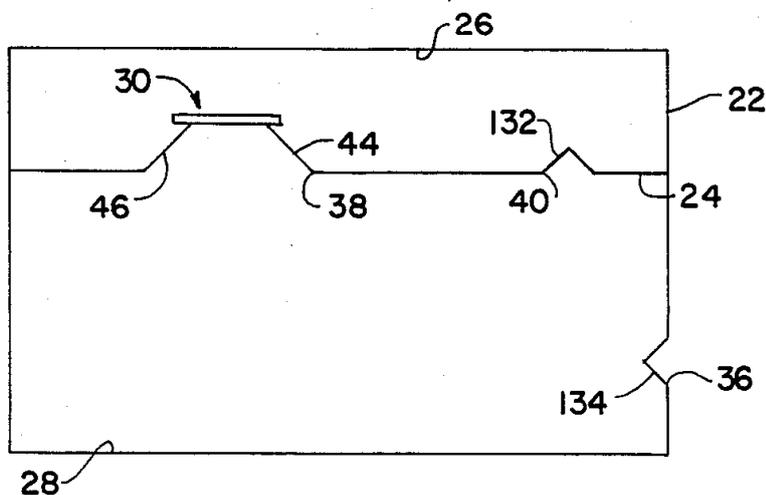
H04R 1/2838

{of the bandpass type}

Definition statement

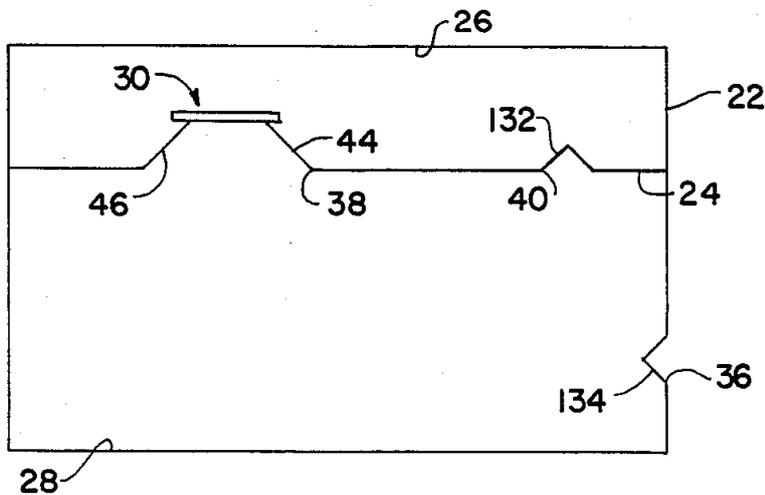
This place covers:

For example (for [H04R 1/2842](#)):

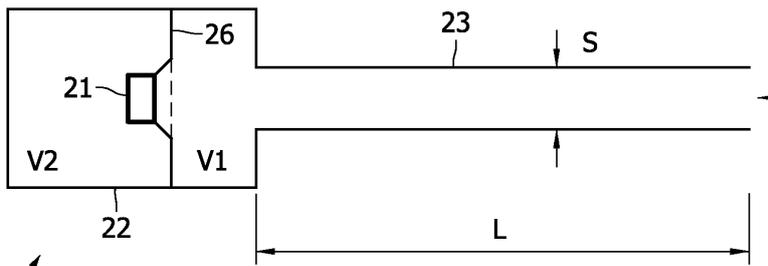


(vent 9 is not tuned to the wavelength)

Example 1st classification rule (the vent is replaced by a passive membrane):



Example 2nd classification rule (vent replaced by tube tuned to the wavelength)



Special rules of classification

- Bandpass type enclosures (invention) and using a passive membrane should be classified in [H04R 1/2838](#) or [H04R 1/2842](#) (invention information), but [H04R 1/283](#) or [H04R 1/2834](#) (additional information) is to be given as well.
- Bandpass type enclosures (invention) and using an acoustic labyrinth of transmission line should be classified in [H04R 1/2838](#) or [H04R 1/2842](#) (invention information) but [H04R 1/2853](#) or [H04R 1/2857](#) (additional information) is to be given as well.

H04R 1/2846

{Vents, i.e. ports, e.g. shape thereof or tuning thereof with damping material (number or position of ports [H04R 1/2838](#); vents in bass reflex type enclosures [H04R 1/2823](#))}

References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Number or position of ports in enclosures of the bandpass type | H04R 1/2838 |
|--|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------------------------------|-----------------------------|
| Vents in bass reflex type enclosures | H04R 1/2823 |
|--------------------------------------|-----------------------------|

H04R 1/2853

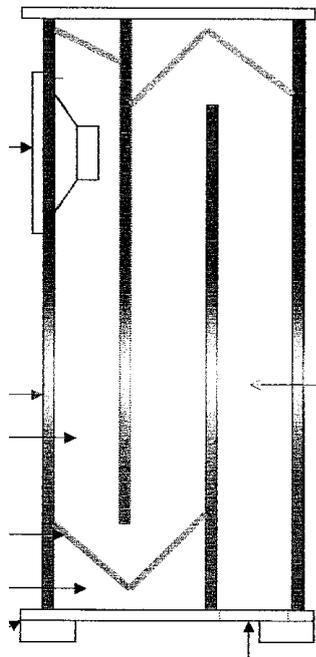
{using an acoustic labyrinth or a transmission line}

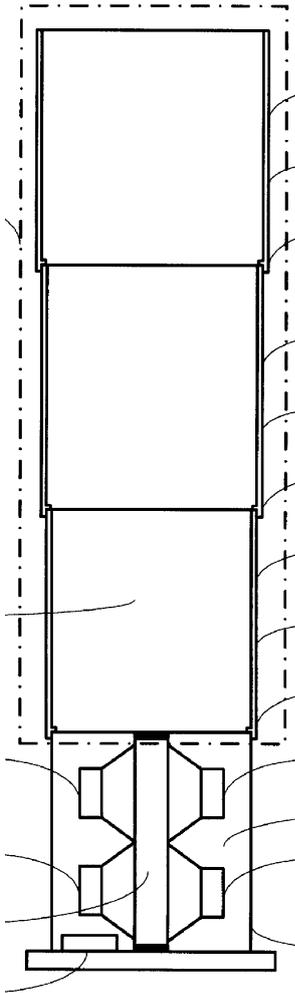
Definition statement

This place covers:

Enclosures using an acoustic labyrinth or a transmission line. The acoustic labyrinth or the transmission line can be open or closed.

For example (for [H04R 1/2857](#)):





The length of the top tubular part is tuned to the wavelength.

Special rules of classification

Acoustic labyrinths or transmission lines (invention) and being used in a bandpass type enclosure is classified in [H04R 1/2853](#) or [H04R 1/2857](#) (invention information), but [H04R 1/2838](#) or [H04R 1/2842](#) (additional information) is to be given as well.

H04R 1/2861

{using a back-loaded horn}

Definition statement

This place covers:

Enclosures using a back-loaded horn. The horn has an aperture surface area that increases with distance from the transducer along the horn axis.

H04R 1/2869

{Reduction of undesired resonances, i.e. standing waves within enclosure, or of undesired vibrations, i.e. of the enclosure itself}

Definition statement

This place covers:

Reduction of undesired resonances not covered by its subgroups, e.g. by means of Helmholtz resonators

H04R 1/2876

{by means of damping material, e.g. as cladding (damping material for tuning desired resonances [H04R 1/2807](#), e.g. in vents [H04R 1/2823](#), [H04R 1/2846](#))}

References**Limiting references**

This place does not cover:

| | |
|--|--|
| The use of damping material to tune vents | H04R 1/2823 ; H04R 1/2846 |
| The use of damping material to tune transmission lines | H04R 1/2853 |

H04R 1/2884

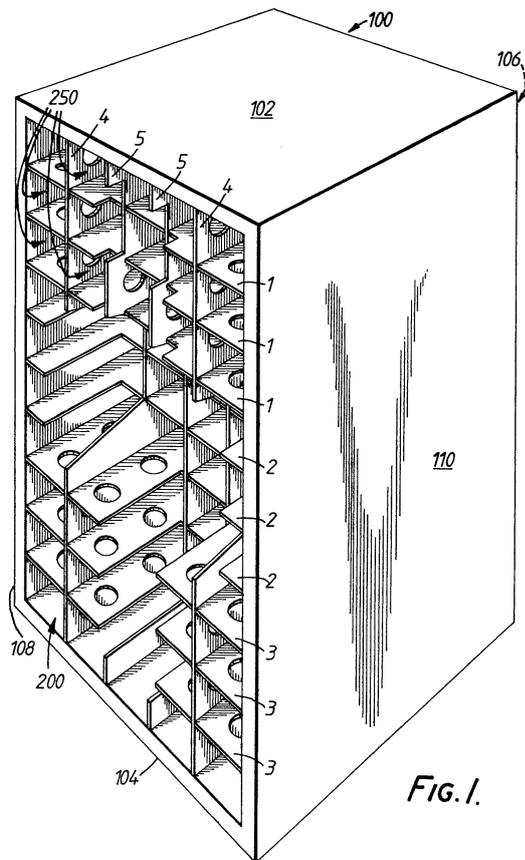
{by means of the enclosure structure, i.e. strengthening or shape of the enclosure (by means of Helmholtz resonators [H04R 1/2869](#))}

Definition statement

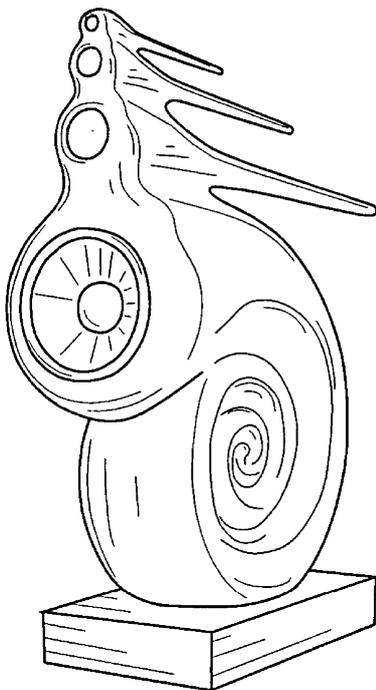
This place covers:

For example (for [H04R 1/2888](#)):

Stiffening panels inside the enclosure



Shape of the enclosure to reduce reflexions within the enclosure



References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Reduction of undesired resonances by means of Helmholtz resonators | H04R 1/2869 |
|--|-----------------------------|

H04R 1/2892

{Mountings or supports for transducers}

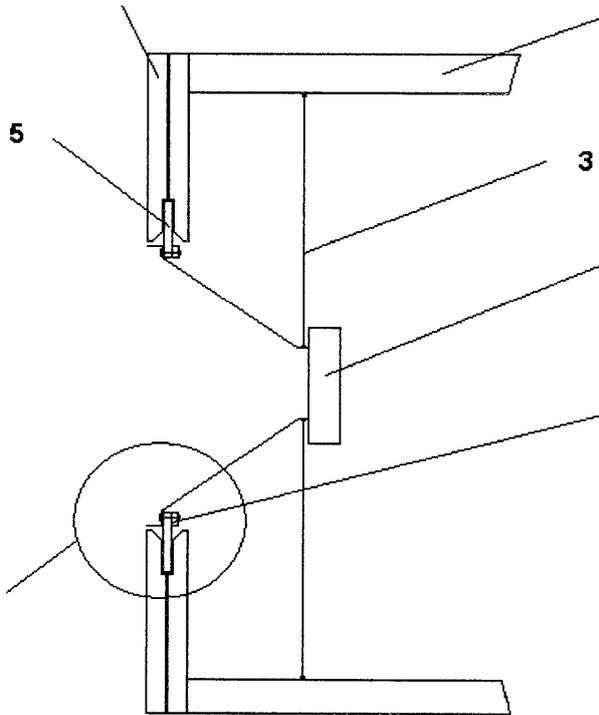
Definition statement

This place covers:

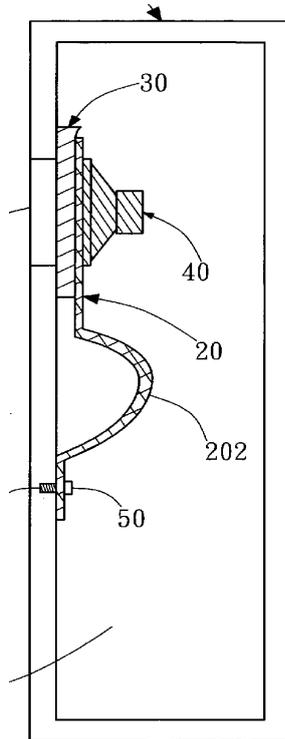
For example (for [H04R 1/2896](#)): DE202004017450U (rubber transducer mounting), US2005152570.

For example (for [H04R 1/2896](#)):

Rubber transducer mounting (5) combined with flexible cables (3):



Elastic mounting (20) with dampening buffer element (30)



H04R 1/30

Combinations of transducers with horns, e.g. with mechanical matching means {, i.e. front-loaded horns} (horns in general [G10K](#); {transducer enclosures or mountings using a back-loaded horn [H04R 1/2861](#); application of horns as guiding means to obtain a predetermined directivity characteristic [H04R 1/345](#)})

Definition statement

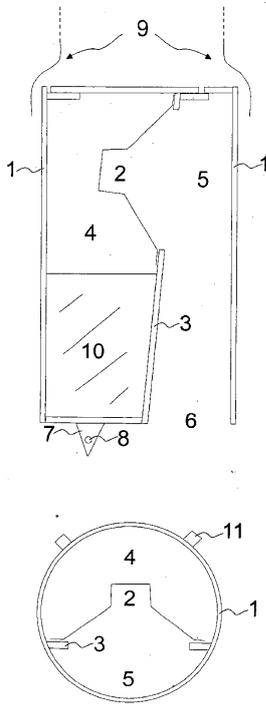
This place covers:

Combinations of transducers with front-loaded horns; Enclosures using front-loaded horns, the acoustic horns predominantly being characterised by the mechanical matching, even though a directivity effect is also present

The horn has an aperture surface area that increases with distance from the transducer along the horn axis

Definition statement

In the example shown on the left the exponential area increase is obtained by the combination of a cylindrical housing (1) with a flat sloped plate (3).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Transducer enclosures or mountings using a back-loaded horn | H04R 1/2861 |
| Application of horns as guiding means to obtain a predetermined directivity characteristic | H04R 1/345 |
| Horn in general | G10K 11/02 |

Special rules of classification

Further detail is covered by the subgroup of Indexing Code group [H04R 2400/13](#) listed below. Classification is obligatory.

H04R 1/32

for obtaining desired directional characteristic only {(specially adapted for hearing aids [H04R 25/40](#))}

Definition statement

This place covers:

Arrangements where the focus lies in the way the desired directional characteristic is obtained

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|----------------------------|
| Arrangements in hearing aids for obtaining desired directional characteristic | H04R 25/40 |
|---|----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Mounting transducers, e.g. provided with mechanical moving or orienting device | G10K 11/004 |
|--|-----------------------------|

Special rules of classification

- If a frequency effect is also addressed classification in [H04R 1/22](#) or subgroups as additional information is required as well
- Further detail is covered by Indexing Code group [H04R 2410/01](#). Classification is obligatory.

H04R 1/34

by using a single transducer with sound reflecting, diffracting, directing or guiding means {(specially adapted for hearing aids [H04R 25/402](#))}

Definition statement

This place covers:

Sound reflecting, diffracting, directing or guiding means, e.g. horns to obtain a desired directivity characteristic, acoustic lenses, tubes, or phase plugs

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|-----------------------------|
| Arrangements specially adapted for hearing aids | H04R 25/402 |
|---|-----------------------------|

H04R 1/345

{for loudspeakers}

Definition statement

This place covers:

For example: (horn (top figure) used to obtain predetermined directivity (lower figures))

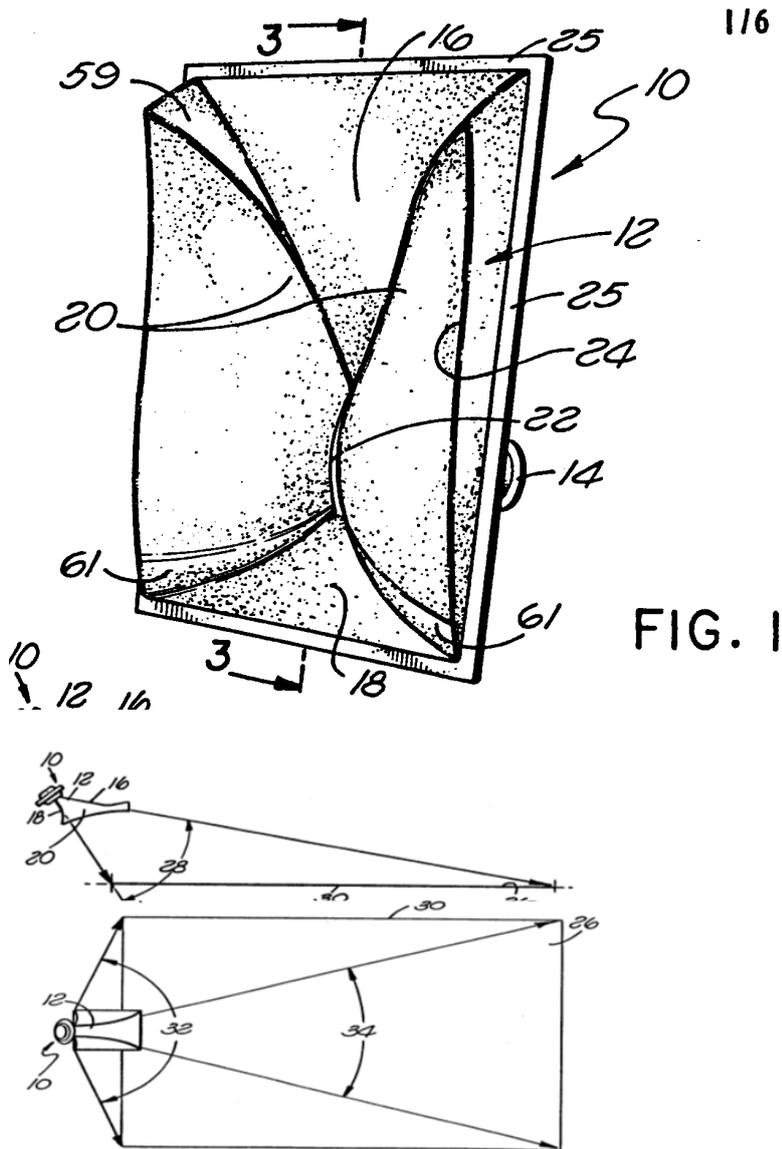
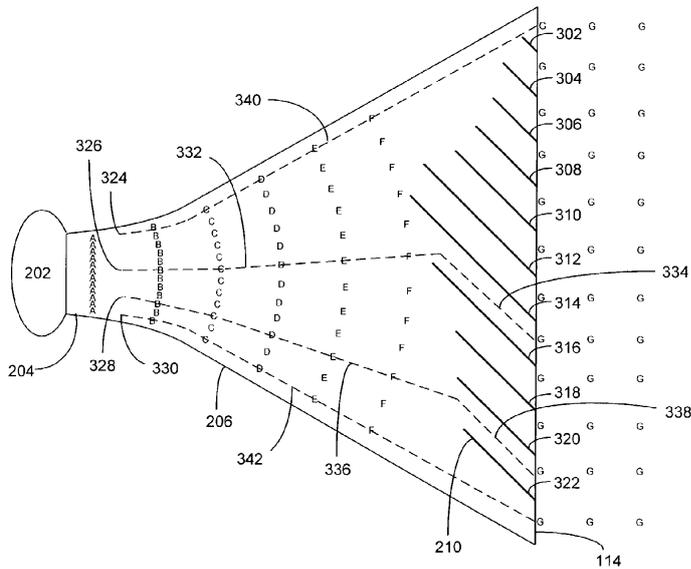


FIG. 1

For example: (plurality of plates (210) functioning as an acoustic lens).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Horn-loaded compression drivers and impedance frequency matching | H04R 1/30 |
| Single aperture acoustic lenses | H04R 1/36 |
| Methods or devices for sound-focusing or directing | G10K 11/26 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2201/34](#) listed below. Classification is obligatory.

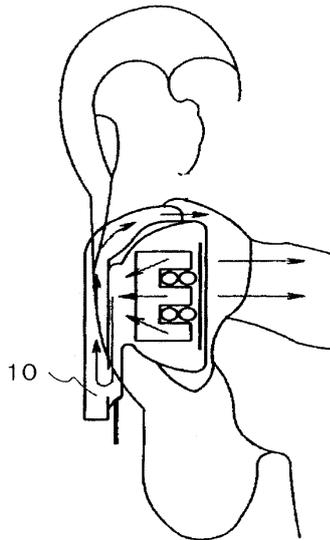
H04R 1/347

{for obtaining a phase-shift between the front and back acoustic wave}

Definition statement

This place covers:

For example:



H04R 1/36

by using a single aperture of dimensions not greater than the shortest operating wavelength

Definition statement

This place covers:

Such an aperture functions as an acoustic lens

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------------------------|---------------------------|
| Other types of acoustic lenses | H04R 1/34 |
|--------------------------------|---------------------------|

H04R 1/40

by combining a number of identical transducers {(specially adapted for hearing aids [H04R 25/405](#))}

References

Limiting references

This place does not cover:

| | |
|--|--|
| Combining a number of identical transducers for stereophonic purpose | H04R 5/02 , H04R 5/027 |
|--|--|

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|--|-----------------------------|
| Combining a number of identical transducers specially adapted for hearing aids | H04R 25/405 |
|--|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Constructional aspects of beam steering | B06B 1/0607 , B06B 1/085 |
| Sound-focusing or directing using electrical steering of transducer arrays, e.g. beam steering | G10K 11/34 |

Special rules of classification

Further detail is covered by the subgroups of Indexing Code group [H04R 2201/40](#). Classification is obligatory.

H04R 1/403

{loud-speakers}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Circuits for distributing signals of two or more loudspeakers | H04R 3/12 |
|---|---------------------------|

H04R 1/406

{microphones}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Circuits for combining the signals of two or more microphones | H04R 3/005 |
|---|----------------------------|

Special rules of classification

Further detail is covered by the subgroup of Indexing Code group [H04R 2410/05](#). Classification is obligatory.

H04R 1/46

Special adaptations for use as contact microphones, e.g. on musical instrument, on stethoscope (throat mountings [H04R 1/14](#))

References

Limiting references

This place does not cover:

| | |
|----------------------------------|---------------------------|
| Throat mountings for microphones | H04R 1/14 |
|----------------------------------|---------------------------|

H04R 3/00

Circuits for transducers {, loudspeakers or microphones}

Definition statement

This place covers:

Circuits for transducers, e.g.:

- Damping motional feedback circuits.
- Circuits for combining the signals of two or more microphones.
- Protection circuits for transducers.
- Circuits for preventing acoustic reaction.
- Circuits for distributing a signal to a plurality of loudspeakers.
- Circuits for correcting the frequency response of transducers.

References

Limiting references

This place does not cover:

| | |
|---|--|
| Testing of transducer, loudspeaker or microphone connection for non-stereophonic purposes | H04R 29/001 ; H04R 29/004 |
| Arrangements for producing a reverberation or echo sound | G10K 15/08 |
| Amplifiers | H03F |

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|--|-----------------------------|
| Circuits for stereophonic arrangements | H04R 5/04 |
| Circuits for combining the signals of two or more microphones or loudspeakers specially adapted for hearing aids | H04R 25/407 |
| Public address systems, e.g. circuits therefor | H04R 27/00 |
| Stereophonic systems | H04S |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Driving circuits for generating mechanical vibrations of infrasonic, sonic, or ultrasonic frequency (specially adapted for particular applications, see the relevant subclass) | B06B 1/0207 |
| Audio-frequency transformers or mutual inductances, i.e. not suitable for handling frequencies considerably beyond the audio range | H01F 19/02 |
| Low frequency amplifiers, e.g. audio preamplifiers | H03F 3/181 |
| Power amplifiers using a combination of several semiconductor amplifiers | H03F 3/211 |
| Combinations of amplifiers using coupling networks with distributed constants | H03F 3/602 |
| Combinations of amplifiers, e.g. multi-channel amplifiers for stereophonics | H03F 3/68 |
| Control of amplification | H03G |
| Remote control of amplification, tone, or bandwidth | H03G 1/02 |
| Arrangements for preventing acoustic feedback | H04M 1/20 |
| Two-way loud-speaking telephone systems with means for conditioning the signal, e.g. for suppressing echoes for one or both directions of traffic | H04M 9/08 |

Special rules of classification

Further detail is covered by the subgroups of Indexing Code groups [H04R 2201/401](#), [H04R 2201/403](#), [H04R 2201/405](#), [H04R 2203/12](#), [H04R 2410/07](#), [H04R 2420/01](#), [H04R 2420/03](#), [H04R 2420/05](#), [H04R 2430/01](#) and [H04R 2430/03](#). Classification is obligatory.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------------------|--|
| Deaf aid | hearing aid, auditory prosthesis |
| Stereophonic system | two- or more channel system, e.g. quadraphonic, ambisonic or similar systems |

H04R 3/005

{for combining the signals of two or more microphones (specially adapted for hearing aids [H04R 25/407](#))}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|--|-----------------------------|
| Circuits for combining the signals of two or more microphones to obtain desired directional characteristics specially adapted for hearing aids | H04R 25/407 |
| Circuits for combining the signals of two or more microphones, i.e. mixing, specially adapted for hearing aids | H04R 25/43 |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---|
| Combining a number of identical transducers | H04R 1/40 and the subgroups of H04R 2201/40 |
| Spatial or constructional stereophonic arrangement of microphones | H04R 5/027 |
| Direction-finders for determining the direction from which infrasonic, sonic, ultrasonic, not having a directional significance, are being received | G01S 3/80 |
| Systems for determining distance or velocity not using reflection or re-radiation and using ultrasonic, sonic, or infrasonic waves | G01S 11/14 |
| Circuits for sound-focusing or directing using electrical steering of transducer arrays, e.g. beam steering | G10K 11/34 |
| Speech recognition techniques specially adapted for robustness in adverse environments | G10L 15/20 |
| Combining signals of a signal microphone and a noise microphone for speech processing | G10L 2021/02165 |
| Beamforming for speech processing | G10L 2021/02166 |
| Telephonic conference arrangements | H04M 3/56 |
| Video conference systems | H04N 7/15 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2410/01](#), [H04R 2410/05](#) and [H04R 2430/20](#) and its subgroups. Classification is obligatory.

H04R 3/02

for preventing acoustic reaction {, i.e. acoustic oscillatory feedback (specially adapted for hearing aids [H04R 25/453](#))}

References**Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|--|-----------------------------|
| Electronic prevention acoustic reaction specially adapted for hearing aids | H04R 25/453 |
|--|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Mechanical acoustic echo cancellation for telephony | H04M 1/20 |
| Electronic acoustic echo cancellation for telephony | H04M 9/08 |

H04R 3/04

for correcting frequency response

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Synergistic effects of band splitting and sub-band processing | H04R 2430/03 |
| Tone control or bandwidth control in amplifiers | H03G 5/00 |

H04R 3/12

for distributing signals to two or more loudspeakers {(specially adapted for hearing aids [H04R 25/407](#))}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|--|-----------------------------|
| Circuits for combining the signals of two or more loudspeakers to obtain a desired directivity characteristic specially adapted for hearing aids | H04R 25/407 |
| Public address systems | H04R 27/00 |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Directing sound using electrical steering of transducer arrays, e.g. beam steering | G10K 11/34 |
|--|----------------------------|

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2203/12](#) and [H04R 2430/20](#). Classification is obligatory.

H04R 5/00

Stereophonic arrangements (stereophonic pick-ups [H04R 9/16](#), [H04R 11/12](#), [H04R 17/08](#), [H04R 19/10](#))

Definition statement

This place covers:

Spatial or constructional arrangements of loudspeakers or of electro-acoustic devices for stereophonic purposes or specific circuit arrangements therefor, e.g.

- aspects relating to docking-station type assemblies to obtain an acoustical effect,
- positioning of loudspeakers for spatial sound reproduction,
- plurality of transducers corresponding to a plurality of sound channels in each earpiece of headphones or in a single enclosure,

Definition statement

- single (sub)woofer with two or more satellite loudspeakers for higher frequency band reproduction driven via the (sub)woofer,
- sound field microphones, or
- dummy heads

References**Limiting references**

This place does not cover:

| | |
|--|---|
| Stereophonic pick-ups, i.e. wherein signals are recorded or played back by vibration of a stylus in two orthogonal directions simultaneously | H04R 9/16 , H04R 11/12 , H04R 17/08 , H04R 19/10 |
|--|---|

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------------------|--|
| Stereophonic system | two- or more channel system, e.g. quadraphonic, ambisonic or similar systems |
|---------------------|--|

H04R 5/02**Spatial or constructional arrangements of loudspeakers****Definition statement**

This place covers:

Spatial or constructional arrangements of loudspeakers or loudspeaker transducers for stereophonic reproduction, e.g.

- aspects relating to docking-station type assemblies to obtain an acoustical effect,
- positioning of loudspeakers for spatial sound reproduction,
- plurality of transducers corresponding to a plurality of sound channels in each earpiece of headphones or in a single enclosure, or
- single (sub)woofer with two or more satellite loudspeakers for higher frequency band reproduction driven via the (sub)woofer.

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Mounting radio sets or communication systems in helmets | A42B 3/30 |
| Mounting of acoustic transducers in vehicles | B60R 11/0217 , B60R 11/0247 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2205/021](#), [H04R 2205/022](#), [H04R 2205/024](#) and [H04R 2205/026](#). Classification is obligatory.

H04R 5/027

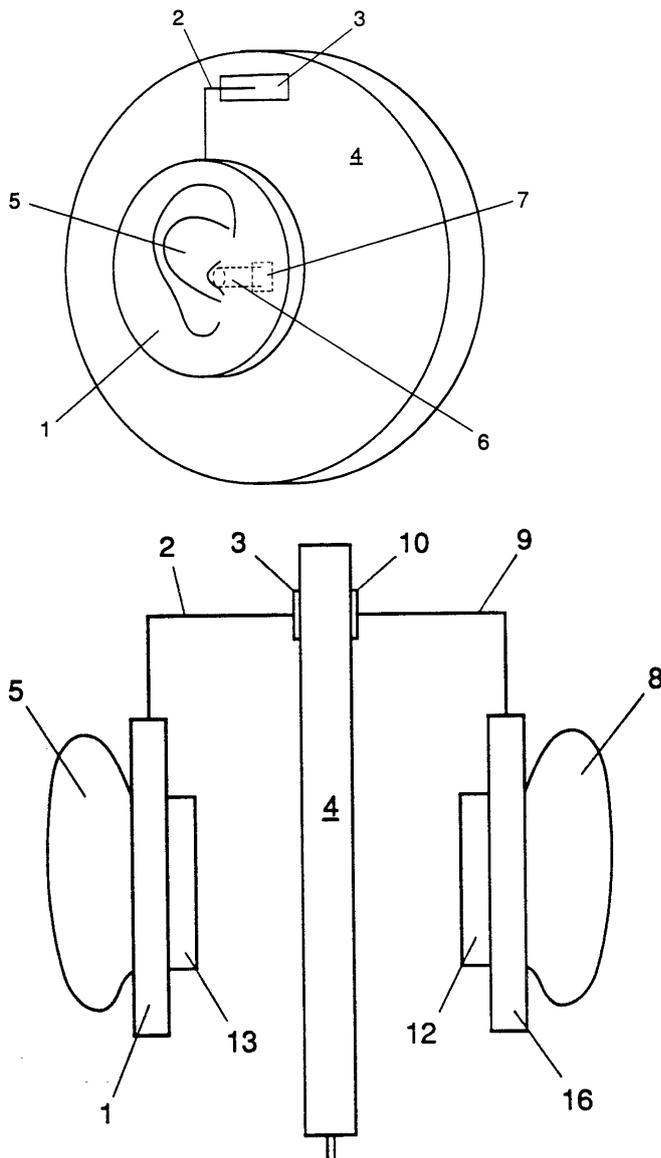
Spatial or constructional arrangements of microphones, e.g. in dummy heads

Definition statement

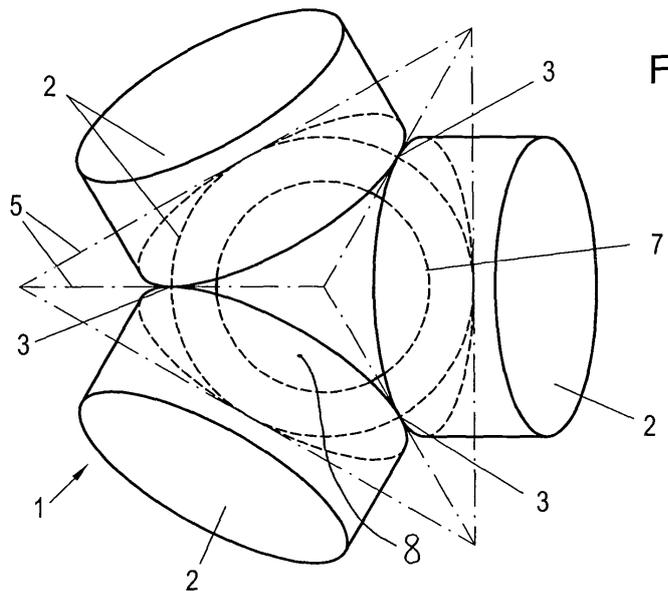
This place covers:

Spatial or constructional arrangements of microphones or microphone transducers for stereophonic sound capture.

For example (dummy head):



For example (sound field microphone):



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Arrangements for obtaining desired frequency or directional characteristics by combining a number of identical transducers microphones | H04R 1/406 |
| Circuits for combining the signals of two or more microphones for non-stereophonic purposes | H04R 3/005 |
| Hearing aid circuits for combining signals of transducers | H04R 25/407 |
| Binaural hearing aids | H04R 25/552 |
| Details of transducer arrays | H04R 2201/40 |

H04R 5/033

Headphones for stereophonic communication {(details thereof, e.g. relating to batteries, cables or control elements [H04R 1/10](#))}

References

Limiting references

This place does not cover:

| | |
|---|---|
| Details thereof, e.g. relating to batteries, cables or control elements | H04R 1/10 |
| Transceivers carried on the body, e.g. in helmets | H04B 1/385 |
| Sound field enhancement in stereophonic headphones | H04S 1/005 , H04S 3/004 |

Special rules of classification

- Concerning inventions relating to hearing devices, if an application describes and shows the invention using only embodiments relating to ear- or headphones then [H04R 1/10](#) or subgroups or

[H04R 5/033](#) or subgroups should be given as invention information. Dependent on the case, the mere statement that the invention is also applicable to hearing aids may render classification under [H04R 25/00](#) useful, but only as additional information. Only if specific non-trivial embodiments for hearing aids are also shown, classification under [H04R 25/00](#) as invention information may be considered as well.

- Further detail is covered by the subgroups of Indexing Code groups [H04R 2201/103](#), [H04R 2201/105](#), [H04R 2420/09](#) and [H04R 2460/03](#). Classification is obligatory.

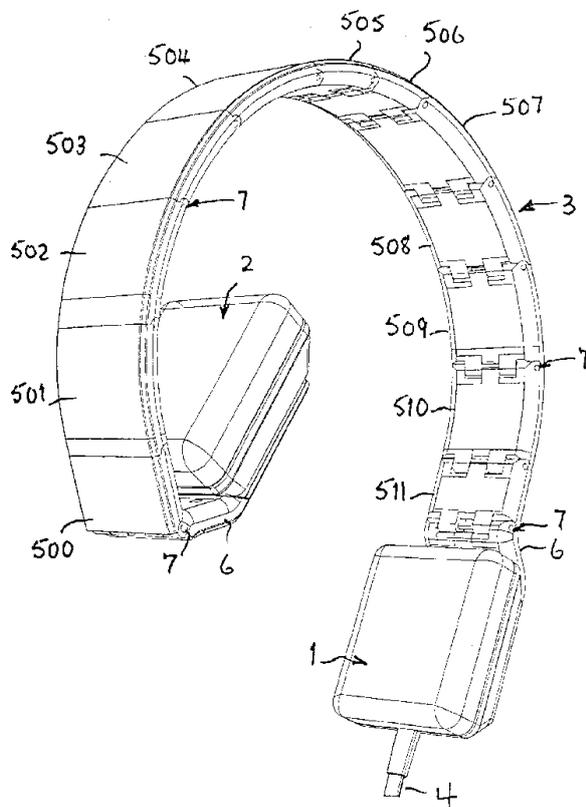
H04R 5/0335

{Earpiece support, e.g. headbands or neckrests (for monophonic headphones [H04R 1/105](#))}

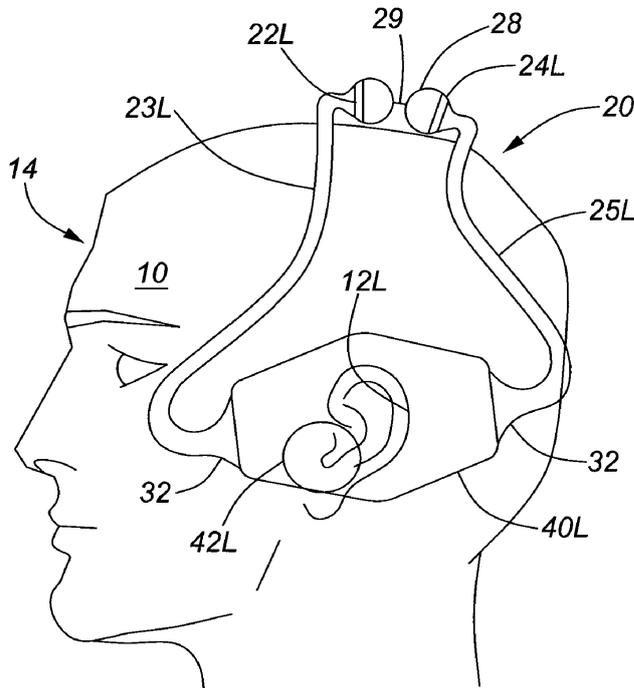
Definition statement

This place covers:

For example: segmented headband for easy storage of the headphone



For example: (head support with loudspeakers mounted thereon (in figure only the left side: left front speaker 22L and left rear speaker 24L both ported to the left ear)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Earpiece support for monophonic headphones, e.g. earhooks | H04R 1/105 |
|---|----------------------------|

H04R 5/04

Circuit arrangements, {e.g. for selective connection of amplifier inputs/outputs to loudspeakers, for loudspeaker detection, or for adaptation of settings to personal preferences or hearing impairments (combinations of amplifiers [H03F 3/68](#); stereophonic systems [H04S](#))}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|----------------------------|
| Circuits or components specially adapted for stereophonic broadcast systems | H04H 20/47 |
| Broadcast systems for the distribution of stereophonic information | H04H 20/88 |
| Circuits or components specially adapted for stereophonic broadcast receiving | H04H 40/36 |
| Stereophonic systems | H04S |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Testing of transducer, loudspeaker or microphone connection for non-stereophonic purposes | H04R 29/001 ; H04R 29/004 |
| Amplifiers | H03F |
| Low frequency amplifiers, e.g. audio preamplifiers | H03F 3/181 |
| Power amplifiers using a combination of several semiconductor amplifiers | H03F 3/211 |
| Combinations of amplifiers using coupling networks with distributed constants | H03F 3/602 |
| Combinations of amplifiers, e.g. multi-channel amplifiers for stereophonics | H03F 3/68 |
| Control of amplification | H03G |
| Remote control of amplification, tone, or bandwidth | H03G 1/02 |
| Transmission systems for stereophonic reception | H04B 1/1646 |
| Powerline communication in general | H04B 3/54 |
| Audio/video applications of powerline communications | H04B 2203/545 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2205/041](#), subgroups of [H04R 2420/00](#), and [H04R 2430/01](#). Classification is obligatory.

H04R 7/00

Diaphragms for electromechanical transducers (in general [F16J 3/00](#)); Cones (for musical instruments [G10](#)){{cones, diaphragms or the like, for emitting or receiving sound in general [G10K 13/00](#); Mounting thereof}}

Definition statement

This place covers:

- Diaphragms for electromechanical transducers.
- Cones
- Mountings thereof, e.g. outer suspension.

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Apparatus or processes specially adapted for the manufacture of diaphragms or surrounds for transducers | H04R 31/003 |
| MEMS structures allowing for movement | B81B 2203/01 |
| Type of movement | B81B 2203/05 |
| Diaphragms in general | F16J 3/00 |
| Pressure measurement / constructional details associated with semiconductive diaphragm sensors, e.g. etching of diaphragms | G01L 9/0042 |
| Cones, diaphragms or the like, for emitting or receiving sound in general | G10K 13/00 |

H04R 7/02

characterised by the construction

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2207/021](#), [H04R 2231/001](#), [H04R 2231/003](#) and [H04R 2307/021](#) - [H04R 2307/029](#). Classification is obligatory.

H04R 7/04

Plane diaphragms

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| In vehicles | B60R 11/0217 |
| Projection screens allowing free passage of sound | G03B 21/565 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2440/01](#) and [H04R 2440/07](#). Classification is obligatory.

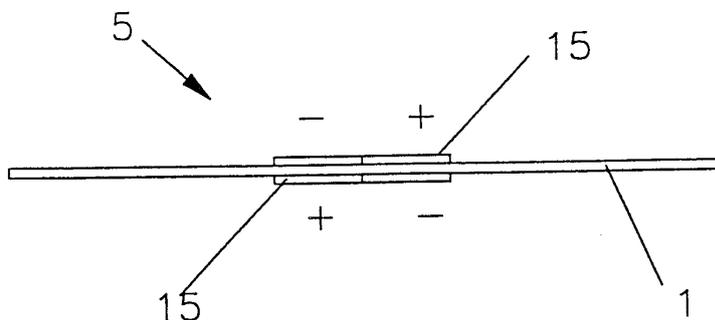
H04R 7/045

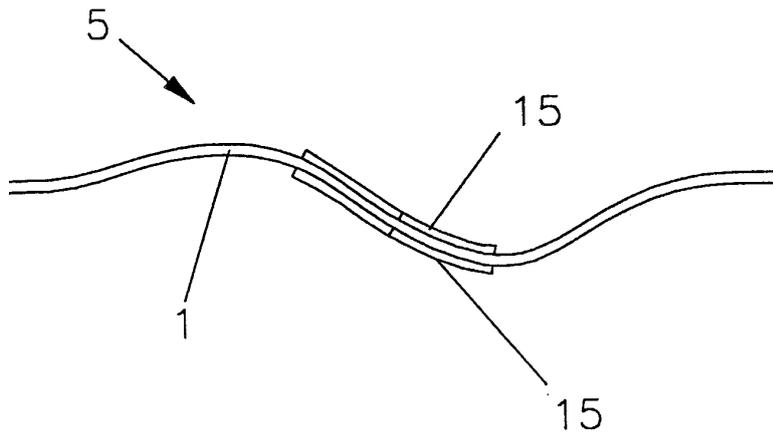
{using the distributed mode principle, i.e. whereby the acoustic radiation is emanated from uniformly distributed free bending wave vibration induced in a stiff panel and not from pistonic motion}

Definition statement

This place covers:

For example: Upon excitation of diaphragm 1 by piezoelectric exciter 15 the diaphragm generating bending wave in itself and eventually produces sound by resonating.





References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Using non-resonant travelling waves | H04R 2440/01 |
| Touch screens using propagation of acoustic waves | G06F 3/043 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2440/03](#) and [H04R 2440/05](#). Classification is obligatory.

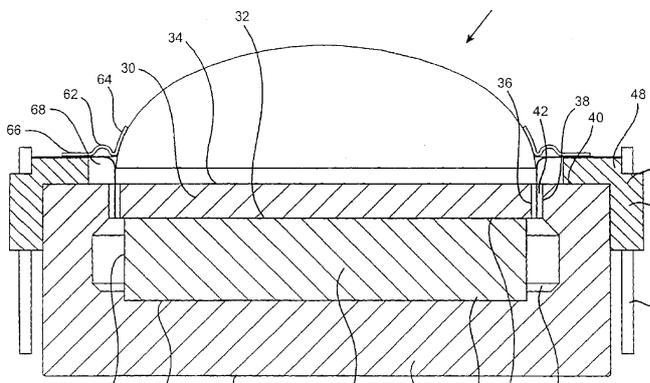
H04R 7/127

{dome-shaped}

Definition statement

This place covers:

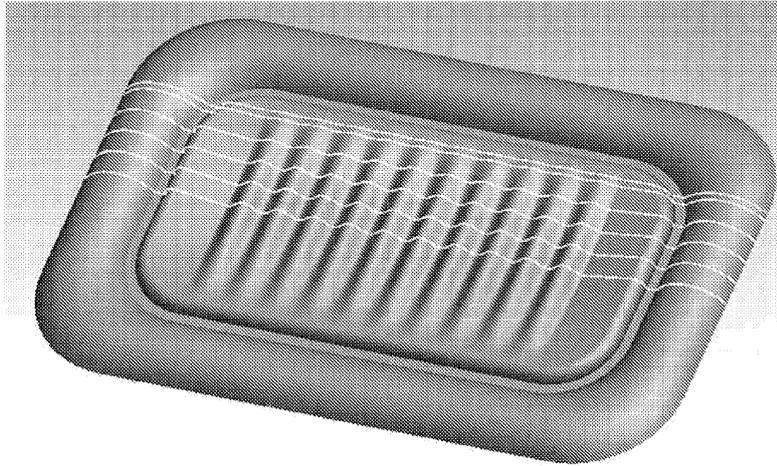
For example: (dome 52).



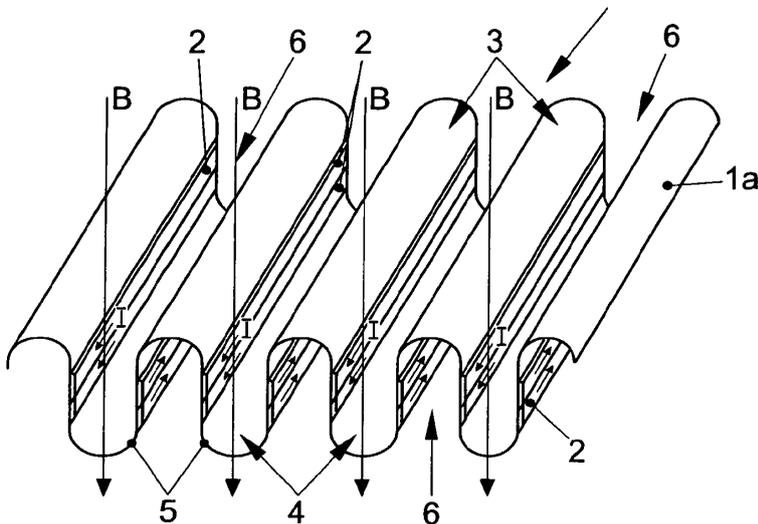
H04R 7/14**corrugated, pleated or ribbed****Definition statement***This place covers:*

For example: DE202007016414 (air motion transformer).

For example: ribs to provide rigidity to the central part of the loudspeaker diaphragm



For example: air motion transformer (AMT) with a meander shaped diaphragm and air pockets (6). Upon energising the transformer (current through conductors 2) and due to the magnetic field perpendicular to the current, the air in the pockets is pushed out or pulled in, thus producing sound.



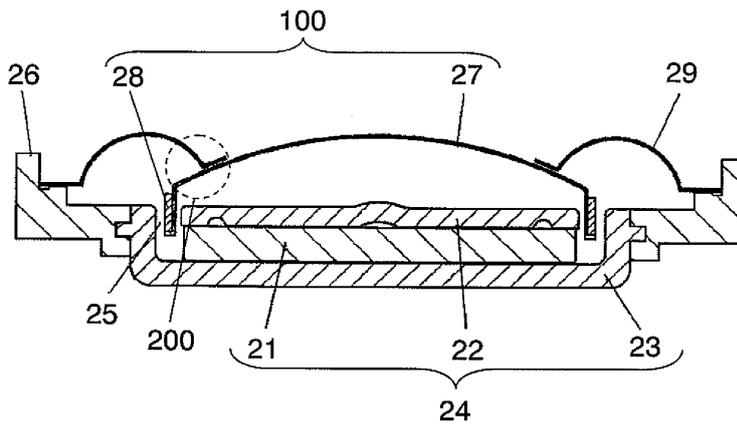
H04R 7/16

Mounting or tensioning of diaphragms or cones

Definition statement

This place covers:

For example: diaphragm is mounted to the frame (26) by surround (29) which is connected to the membrane (27) within its periphery (at 200)



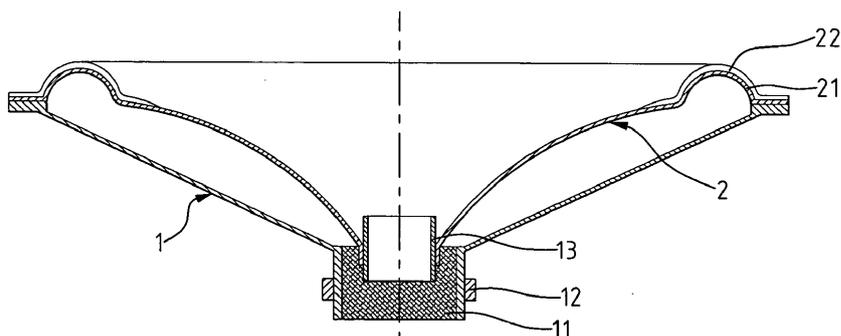
H04R 7/18

at the periphery

Definition statement

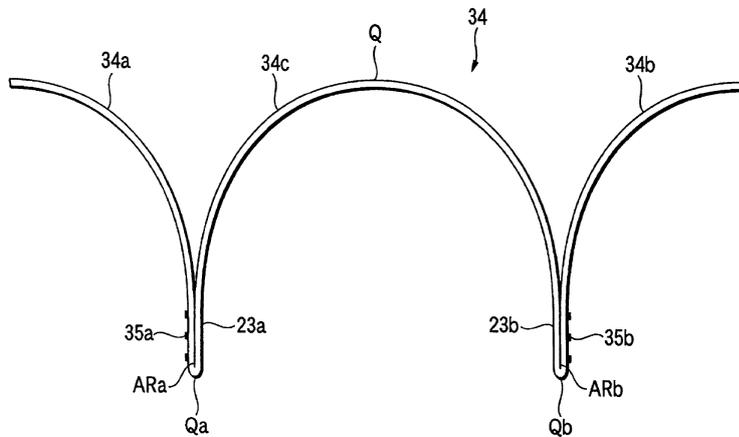
This place covers:

For example: membrane (2) is extended to form outer suspension (21), whose elastic properties are adapted by the elastic layer (22).



Definition statement

For example: membrane (34) divided in a suspension part (34A, 34B) and a central sound producing part (34C)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------------------|-------------------------------|
| Manufacture of surrounds | H04R 2231/003 |
|--------------------------|-------------------------------|

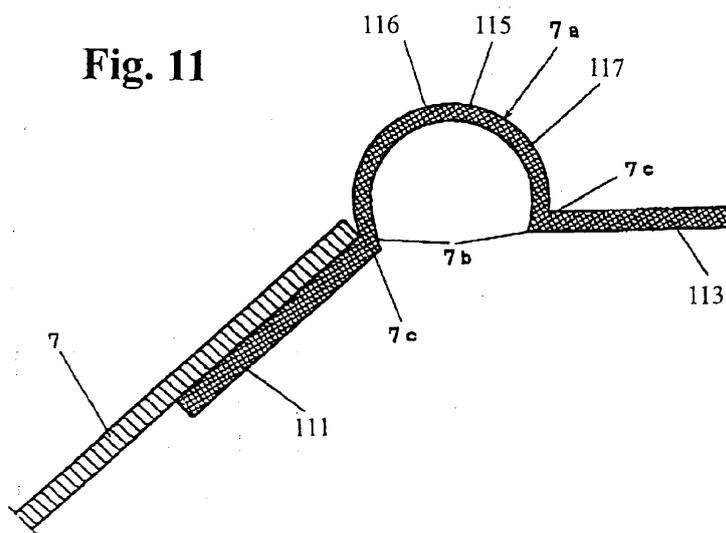
H04R 7/20

Securing diaphragm or cone resiliently to support by flexible material, springs, cords, or strands

Definition statement

This place covers:

For example:



Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2231/001](#), [H04R 2231/003](#), [H04R 2307/201](#) - [H04R 2307/207](#). Classification is obligatory.

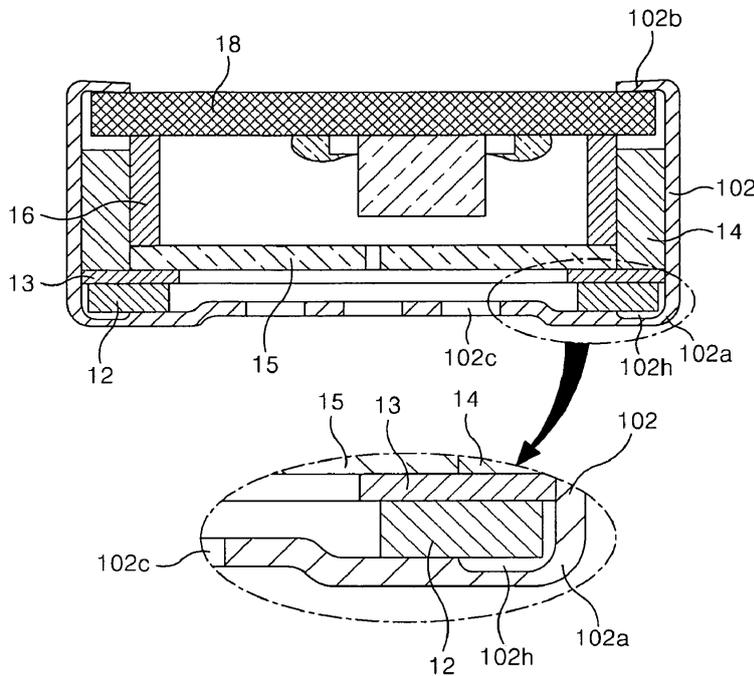
H04R 7/22

Clamping rim of diaphragm or cone against seating

Definition statement

This place covers:

For example: Microphone comprising a vibrating plate (12) with polar ring which is clamped via a spacer (13) between base (14, 16) and the casing (102). Groove 102h is formed to prevent deformation of the polar ring which would negatively affect the acoustic properties membrane (2) is extended to form outer suspension (21), whose elastic properties are adapted by the elastic layer (22).



H04R 7/24

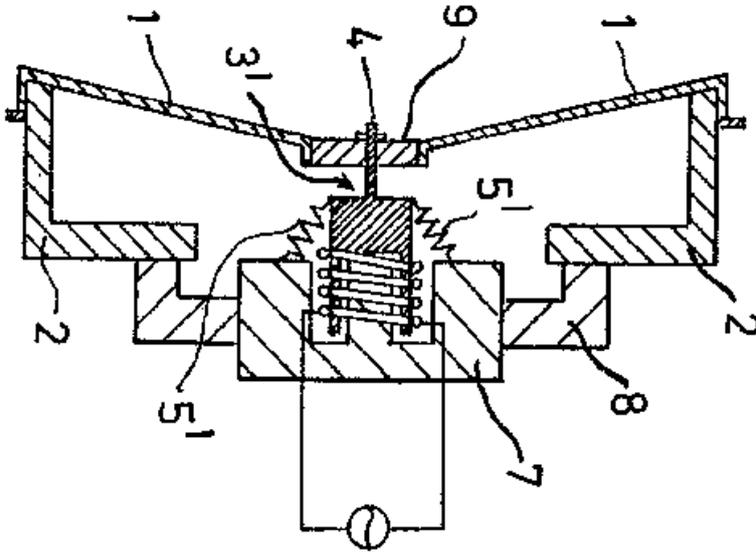
Tensioning by means acting directly on free portions of diaphragm or cone

Definition statement

This place covers:

For example: EP0330423.

For example: tensioning by springs 5'



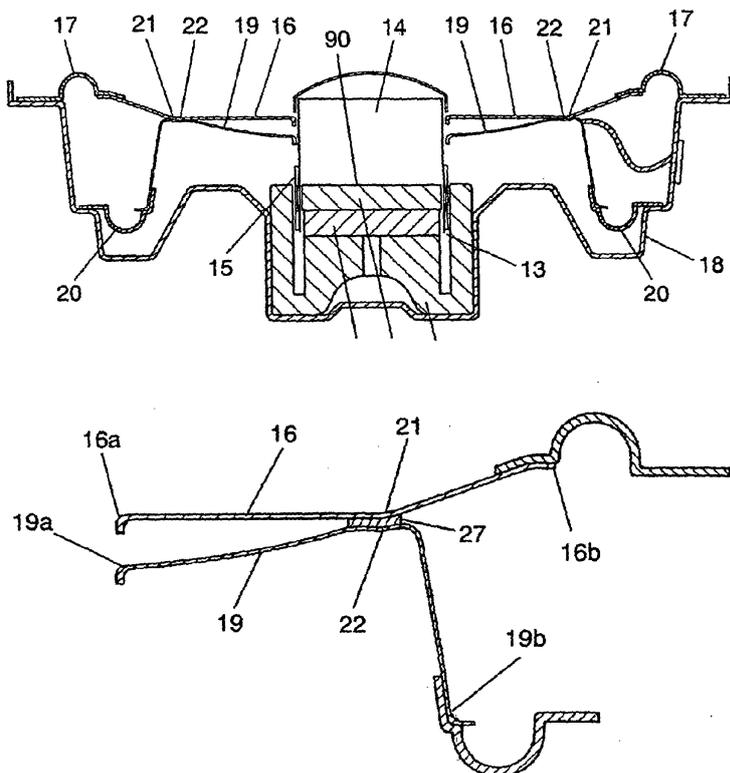
H04R 7/26

Damping by means acting directly on free portion of diaphragm or cone (air damping [H04R 1/28](#))

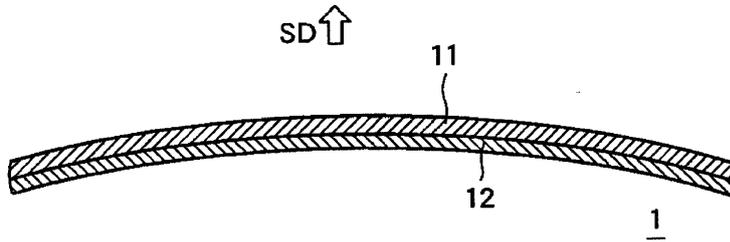
Definition statement

This place covers:

For example: damping by elastic material 27



For example: sound producing diaphragm provided with a damping layer (12) to dampen vibration in the diaphragm



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Transducer mountings or enclosures providing mechanical or acoustic impedances by air damping | H04R 1/28 |
|---|---------------------------|

H04R 9/00

Transducers of moving-coil, moving-strip, or moving-wire type

Definition statement

This place covers:

Transducers of moving-coil, moving-strip, or moving-wire type, e.g.

- general constructional aspects thereof
- cooling aspects;
- constructional aspects of the magnetic circuit, e.g. to reduce eddy currents or stray flux;
- aspects of the voice coil, i.e. mounting, construction or centring thereof

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Generating mechanical vibrations of infrasonic, sonic, or ultrasonic frequency operating with electromagnetism, e.g. using vibrating magnet, armature or coil system | B06B 1/045 |
| Dynamo-electric motors with vibrating magnet, armature or coil system | H02K 33/00 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2201/003](#) and the subgroups of Indexing Code group [H04R 2440/00](#). Classification is obligatory.

H04R 9/02

Details

Definition statement

This place covers:

- General constructional aspects of the transducers;
- Cooling aspects;
- Constructional aspects of the magnetic circuit, e.g. to reduce eddy currents or stray flux;
- Aspects of the voice coil, i.e. mounting, construction or centring thereof.

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2209/021](#) - [H04R 2209/027](#) and the subgroups of Indexing Code group [H04R 2400/00](#). Classification is obligatory.

H04R 9/025

{Magnetic circuit}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-------------------------------|
| Manufacturing aspects of the magnetic circuit of loudspeaker or microphone transducers | H04R 2209/024 |
|--|-------------------------------|

H04R 9/027

{Air gaps using a magnetic fluid}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Magnetic liquids in general, e.g. ferrofluids | H01F 1/44 |
|---|---------------------------|

H04R 9/04

Construction, mounting, or centering of coil

Special rules of classification

Further detail is covered by the subgroups of Indexing Code groups [H04R 2209/041](#) and [H04R 2209/043](#) listed below. Classification is obligatory.

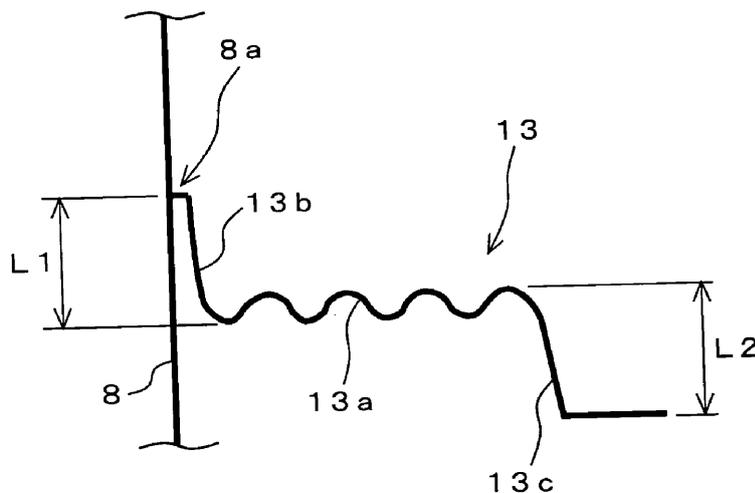
H04R 9/043

{Inner suspension or damper, e.g. spider (outer suspension or surround [H04R 7/16](#))}

Definition statement

This place covers:

For example: the inner suspension (13) is formed with leg portions (13b, 13c) having equal length, to prevent lateral vibration of the bobbin (8). Thus excursion of suspension and thus of the diaphragm can be increase without increasing the diameter of the inner suspension.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|------------------------------|---------------------------|
| Outer suspension or surround | H04R 7/16 |
|------------------------------|---------------------------|

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|--------|--|
| spider | inner suspension usually placed between voice coil former and frame, for providing a restoring force enabling the return of the transducer membrane to its normal resting position and for centring the voice coil |
|--------|--|

H04R 9/045

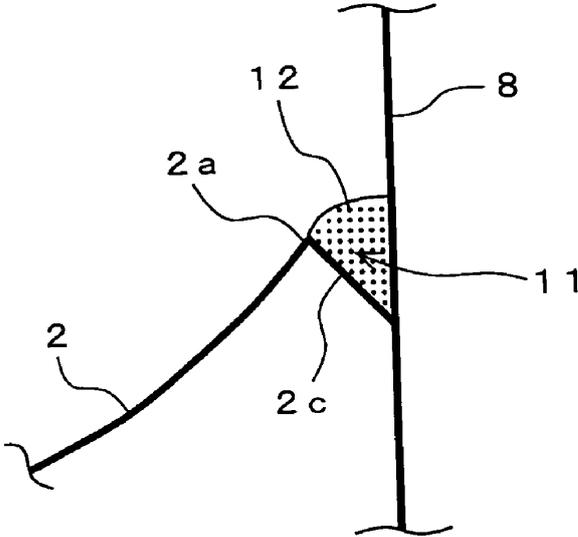
{Mounting ([H04R 9/043](#) takes precedence)}

Definition statement

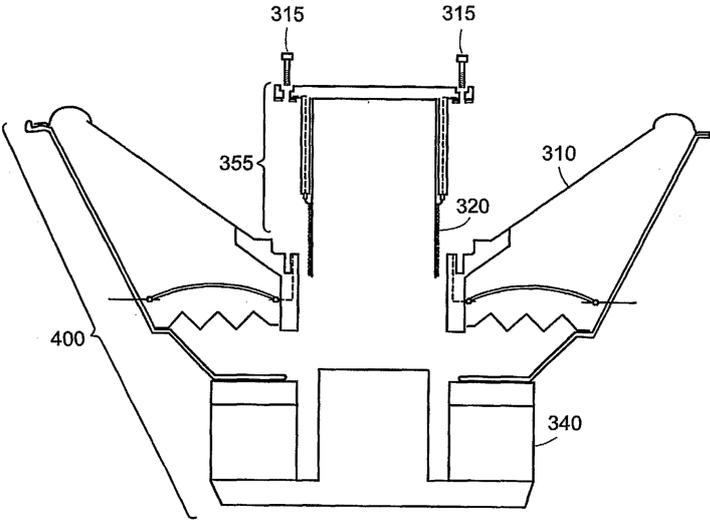
This place covers:

Mounting of the voice coil or the bobbin on which the voice coil is wound

For example: the connection between bobbin (8) and diaphragm (2) is provided with a groove, which is filled with glue to strengthen the connection.

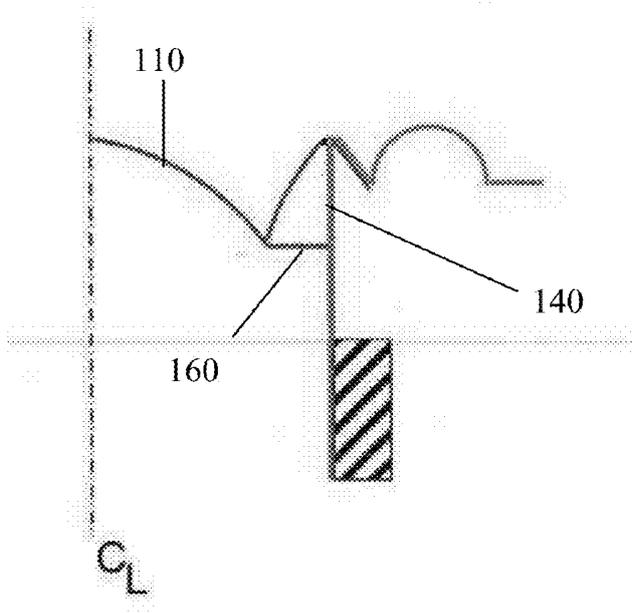


Example: bobbin assembly (355) removably mounted to the inner circumference of the diaphragm (310). Thus replacement of damaged assembly requires minimal effort.



Definition statement

Example: bobbin (140) is mounted at its top directly to outer suspension and in the middle via bridge (160). Thus the bobbin is prevented from bending.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|----------------------------|----------------------------|
| Inner suspension or damper | H04R 9/043 |
|----------------------------|----------------------------|

H04R 9/046**{Construction}****Definition statement**

This place covers:

- Constructional aspects of the voice coil, e.g. shape of the coil, the winding angle, shape or material of the windings,
- Constructional aspects of the bobbin on which a voice coil is to be wound, e.g. material, shape, connection with voice coil

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|------------------------------------|--|
| Coils per se and their manufacture | H01F 5/00 ; H01F 41/00 |
|------------------------------------|--|

H04R 9/06

Loudspeakers

Definition statement

This place covers:

- Transducers for loudspeakers of the pistonic type, e.g. compression drivers, or of the distributed mode type;
- Inertial transducers, i.e. transducers for loudspeakers wherein the voice coil is directly mounted to vibrating diaphragm and the magnetic circuit is floating but suspended with respect to the diaphragm and voice coil.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---------------------|---------------------------|
| Telephone receivers | H04R 9/10 |
|---------------------|---------------------------|

Special rules of classification

Further detail is covered by Indexing Code group and by [H04R 2400/13](#). Classification is obligatory.

H04R 9/066

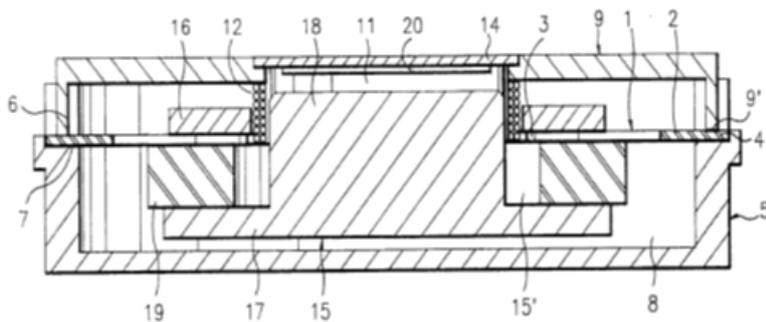
{using the principle of inertia}

Definition statement

This place covers:

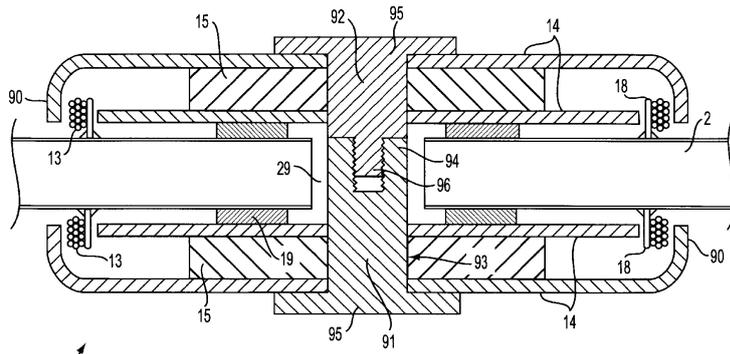
Transducers for loudspeakers wherein the voice coil is directly mounted to vibrating diaphragm and the magnetic circuit is floating but suspended with respect to the diaphragm and voice coil.

For example: body sensed speaker, that can be placed in e.g. waistcoats, cushions, mattresses, belts



Definition statement

For example: exciter for distributed mode loudspeakers (DML)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Transducers of moving-armature or moving-core type | H04R 11/02 |
|--|----------------------------|

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2400/07](#). Classification is obligatory.

H04R 9/08

Microphones

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-------------------------------|
| Transducers having separately controllable opposing diaphragms, e.g. for ring-tone and voice, or for combined microphone/-receiver in telephones | H04R 2209/026 |
| Transducers used as a loudspeaker to generate sound as well as a microphone to detect sound | H04R 2400/01 |

H04R 9/10

Telephone receivers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| Transducers having separately controllable opposing diaphragms, e.g. for ring-tone and voice | H04R 2209/026 |
| Transducers used as a loudspeaker to generate sound as well as a microphone to detect sound | H04R 2400/01 |
| Transducers capable of generating both sound as well as tactile vibration e.g. as used in cellular phones | H04R 2400/03 |

| | |
|--|----------------------------|
| Generating mechanical vibrations of infrasonic, sonic, or ultrasonic frequency using vibrating magnet, armature or coil system | B06B 1/045 |
| Generating vibrations with systems involving rotary unbalanced masses | B06B 1/16 |
| Tactile signalling systems | G08B 6/00 |

H04R 11/00

Transducers of moving-armature or moving-core type (acoustic diaphragm of magnetisable material directly coacting with electromagnet [H04R 13/00](#))

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Transducers of moving-coil, moving-strip, or moving-wire type | H04R 9/00 |
| Loudspeaker transducers using the principle of inertia | H04R 9/066 |
| Acoustic diaphragm of magnetisable material directly co-acting with electromagnet | H04R 13/00 |
| Generating mechanical vibrations of infrasonic, sonic, or ultrasonic frequency operating with electromagnetism, e.g. using vibrating magnet, armature or coil system | B06B 1/045 |
| Dynamo-electric motors with vibrating magnet, armature or coil system | H02K 33/00 |

Special rules of classification

Further detail is covered by the subgroups of Indexing Code groups [H04R 2400/01](#), [H04R 2400/03](#), and [H04R 2440/01](#) - [H04R 2440/07](#).

H04R 11/02

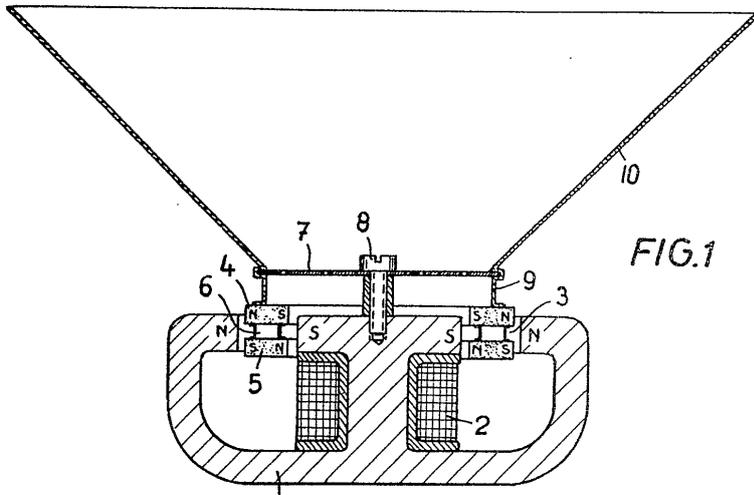
Loudspeakers

Definition statement

This place covers:

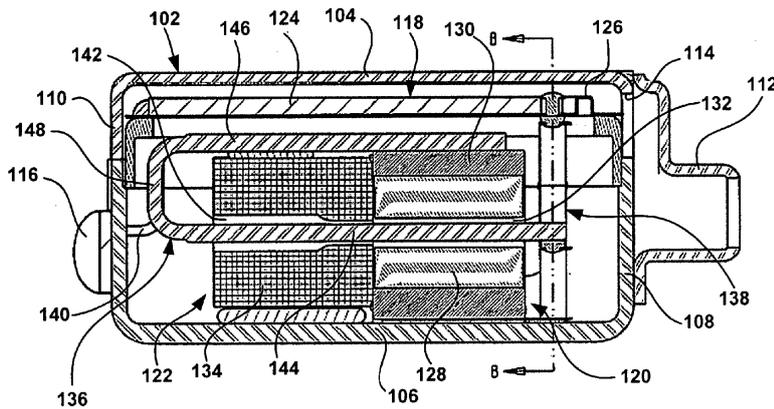
For example:

The voice coil (2) is static. Upon energising the magnets (4-6) move.

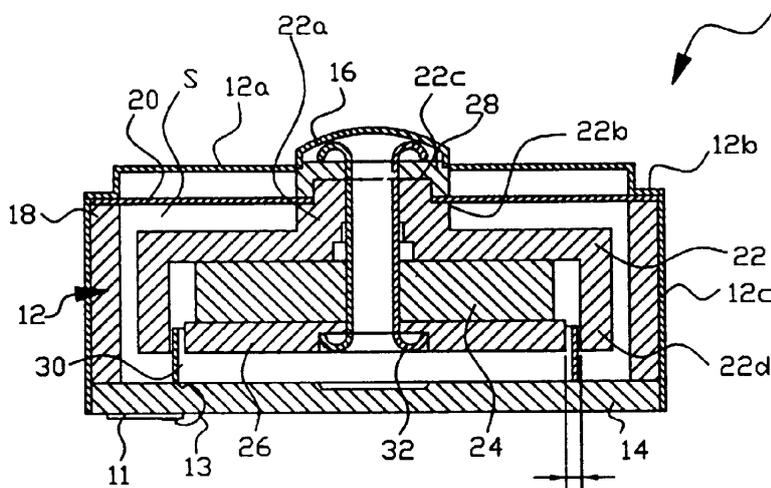


Example of a hearing aid receiver:

Armature 136 has a fixed (146) and a movable arm (144). When coils 134 is energised, movable arm 144 moves and drives membrane (118) via a linkage 138, thus producing sound.



Example of a bone conduction speaker:



Voice coil 30 is mounted directly to base plate 14 which is part of the transducer frame. The magnetic circuit (yoke 22, magnet 24, base plate 26) is movably attached to the frame 12 via damper 20, such that upon energising the voice coil the armature moves.

References

Limiting references

This place does not cover:

| | |
|--|----------------------------|
| Telephone receivers of the moving-armature or moving-core type | H04R 11/06 |
|--|----------------------------|

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2400/07](#) and [H04R 2400/11](#). Classification is obligatory.

H04R 11/06

Telephone receivers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| Transducers having separately controllable opposing diaphragms, e.g. for ring-tone and voice | H04R 2209/026 |
| Transducers used as a loudspeaker to generate sound as well as a microphone to detect sound | H04R 2400/01 |
| Transducers capable of generating both sound as well as tactile vibration e.g. as used in cellular phones | H04R 2400/03 |
| Generating vibrations with systems involving rotary unbalanced masses | B06B 1/16 |
| Tactile signalling systems | G08B 6/00 |

H04R 13/00

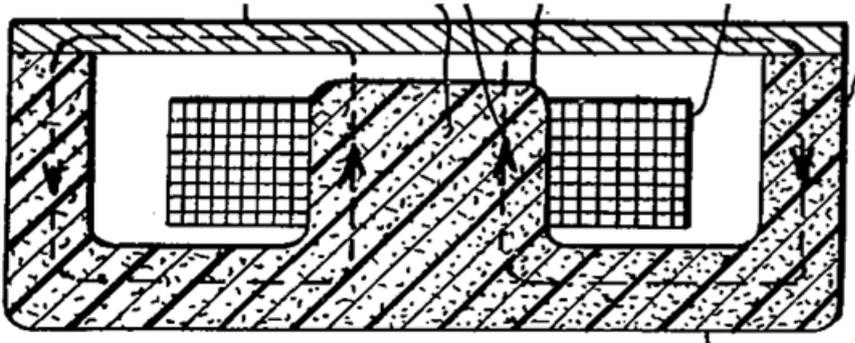
Transducers having an acoustic diaphragm of magnetisable material directly co-acting with electromagnet

Definition statement

This place covers:

Transducers for loudspeakers or microphones, in which the membrane is part of the magnetic circuit.

For example:



Special rules of classification

Further detail is covered by the subgroup of Indexing Code group [H04R 2400/11](#) listed below.
 Classification is obligatory.

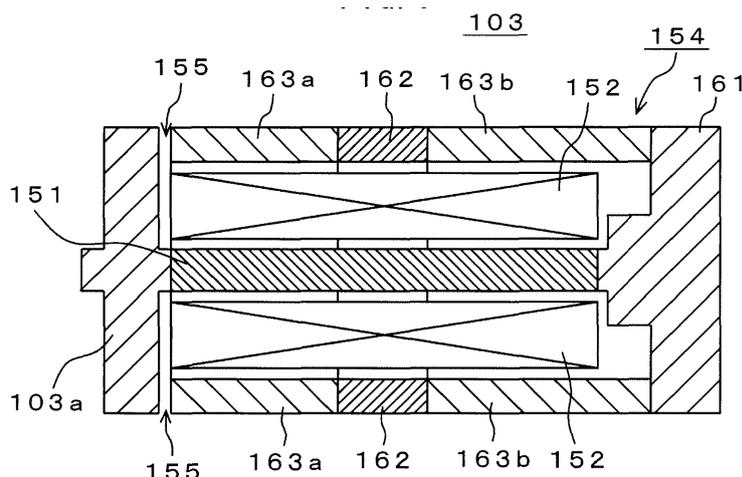
H04R 15/00

Magnetostrictive transducers (magnetostrictive elements in general [H10N 30/00](#))

Definition statement

This place covers:

In the example shown in the figure below a configuration of the magnetostrictive actuator 103 is presented. The magnetostrictive actuator 103 has a rod-like magnetostrictive element 151 that is displaced along its extension direction, a solenoid coil 152 for generating a magnetic field, which is positioned around this magnetostrictive element 151, a driving rod 103a as driving member, which is connected to an end of the magnetostrictive element 151 and transmits any displacement output of the magnetostrictive actuator 103, and a container 154 that contains the magnetostrictive element 151 and the solenoid coil 152 therein.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------------------------------|----------------------------|
| Magnetostrictive elements in general | H10N 30/00 |
|--------------------------------------|----------------------------|

| | |
|--|---|
| Materials; Manufacture of magnetostrictive devices | H10N 35/00 , H10N 35/85 |
| Details of magnetostrictive devices | H10N 35/80 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2201/003](#), [H04R 2217/01](#), [H04R 2400/03](#) and [H04R 2400/11](#). Classification is obligatory.

H04R 17/00

Piezoelectric transducers; Electrostrictive transducers (piezoelectric or electrostrictive elements in general [H10N 30/00](#); details of piezoelectric or electrostrictive motors, generators or positioners {[H10N 30/00](#)})

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---|
| Details of piezoelectric or electrostrictive motors, generators or positioners | H02N 2/00 |
| Piezoelectric or electrostrictive elements in general | H10N 30/00 |
| Manufacture of piezoelectric or electrostrictive devices | H10N 30/01 |
| Details of piezoelectric or electrostrictive devices | H10N 30/80 ; H10N 30/00 |
| Selection of materials for piezoelectric or electrostrictive devices | H10N 30/85 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2201/003](#), [H04R 2217/01](#), [H04R 2400/03](#), [H04R 2400/11](#) and the subgroups of Indexing Code group [H04R 2440/00](#). Classification is obligatory.

H04R 17/005

{using a piezoelectric polymer}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Piezoelectric or electrostrictive devices of macromolecular compositions | H10N 30/857 |
|--|-----------------------------|

H04R 17/02

Microphones

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Piezoelectric or electrostrictive devices with mechanical input and electrical output | H10N 30/30 |
|---|----------------------------|

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2410/03](#). Classification is obligatory.

H04R 17/025

{using a piezoelectric polymer}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Piezoelectric or electrostrictive devices of macromolecular compositions | H10N 30/857 |
|--|-----------------------------|

H04R 19/00

Electrostatic transducers

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Generating mechanical vibrations of infrasonic, sonic, or ultrasonic frequency using electrostatic transducers, e.g. electret-type | B06B 1/0292 |
|--|-----------------------------|

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2400/11](#) and [H04R 2410/03](#). Classification is obligatory.

H04R 19/005

{using semiconductor materials}

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--------------------------------|
| Transducers other than those covered by groups H04R 9/00 - H04R 21/00 using solid state devices | H04R 23/006 |
| Arrangements for avoiding sticking of the flexible or moving parts of MEMS devices having such parts | B81B 3/0002 |
| MEMS packages and encapsulations | B81B 7/0032 |
| Microphones and microspeakers | B81B 2201/0257 |
| MEMS structures allowing for movement | B81B 2203/01 |
| Type of movement | B81B 2203/05 |
| Pressure measurement / constructional details associated with semiconductive diaphragm sensors, e.g. etching of diaphragms | G01L 9/0042 |

H04R 19/02**Loudspeakers ([H04R 19/01](#) takes precedence)****References****Limiting references***This place does not cover:*

| | |
|---|-----------------------------|
| Electrostatic transducers characterised by the use of electrets | H04R 19/01 |
| for loudspeakers | H04R 19/013 |

H04R 19/04**Microphones ([H04R 19/01](#) takes precedence)****References****Limiting references***This place does not cover:*

| | |
|---|-----------------------------|
| Electrostatic transducers characterised by the use of electrets | H04R 19/01 |
| for microphones | H04R 19/016 |

H04R 21/00**Variable-resistance transducers (gaseous resistance transducers [H04R 23/00](#); magneto-resistive transducers [H04R 23/00](#))****References****Limiting references***This place does not cover:*

| | |
|--------------------------------|----------------------------|
| Gaseous resistance transducers | H04R 23/00 |
| Magneto resistive transducers | H04R 23/00 |

H04R 23/00**Transducers other than those covered by groups [H04R 9/00](#) - [H04R 21/00](#) {(diaphragms for transducers of the distributed-mode type [H04R 7/045](#))}****References****References out of a residual place***Examples of places in relation to which this place is residual:*

| | |
|---|----------------------------|
| Transducers of moving-coil, moving-strip or moving-wire type | H04R 9/00 |
| Transducers of moving-armature or moving-core type | H04R 11/00 |
| Transducers having an acoustic diaphragm of magnetisable material directly co-acting with electromagnet | H04R 13/00 |

| | |
|---|----------------------------|
| Magnetostrictive transducers | H04R 15/00 |
| Piezoelectric transducers; Electrostrictive transducers | H04R 17/00 |
| Electrostatic transducers | H04R 19/00 |
| Variable-resistance transducers | H04R 21/00 |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Diaphragms for transducers of the distributed-mode type | H04R 7/045 |
|---|----------------------------|

H04R 23/004

{using ionised gas}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| Sound producing devices using optical excitation, e.g. laser bundle | G10K 15/046 |
| Sound producing devices using electric discharge | G10K 15/06 |

H04R 23/006

{using solid state devices (solid state devices per se [H01L](#))}

Definition statement

This place covers:

Acoustic transducers using solid state devices and not covered by [H04R 9/00](#) - [H04R 21/00](#)

References

Limiting references

This place does not cover:

| | |
|---|-----------------------------|
| Electrostatic transducers using semiconductor materials | H04R 19/005 |
|---|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|----------------------------|----------------------|
| Solid state devices per se | H01L |
|----------------------------|----------------------|

H04R 25/00

Deaf-aid sets {, i.e. electro-acoustic or electro-mechanical hearing aids; Electric tinnitus maskers providing an auditory perception (electrical stimulation of auditory nerves to promote the auditory function [A61N 1/36038](#); optical stimulation of auditory nerves to promote the auditory function [A61N 5/0622](#))}

Definition statement

This place covers:

- Electro-acoustic or electro-mechanical hearing aids
- Electric tinnitus maskers providing an auditory perception
- Electrical or mechanical aspects thereof, e.g.
- signal processing, e.g. beamforming, prevention of acoustic reaction or noise reduction,
- electronic fitting, i.e. initial adaptation, e.g. by a hearing aid acoustician, or subsequent adaptation of hearing aid parameters, e.g. in dependence of listening situation
- testing or monitoring
- wired or wireless external connection or remote control
- manufacture or assembly, e.g. mounting of transducers or of the batteries
- ear tips, ear moulds or there manufacture
- WARNING:
- Groups [H04R 25/30](#) - [H04R 25/75](#) do not correspond to former or current IPC groups.
- Concordance CPC : IPC for these groups is as follows:
- [H04R 25/30-H04R 25/75](#): [H04R 25/00](#)

References

Limiting references

This place does not cover:

| | |
|--|------------------------------|
| Electrical stimulation of auditory nerves to promote the auditory function, e.g. cochlear implants | A61N 1/36038 |
| Optical stimulation of auditory nerves to promote the auditory function | A61N 5/0622 |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Constructions of transducers per se | H04R 9/00 - H04R 23/00 |
| Amplifying systems for the deaf | H04R 27/02 |
| Monitoring arrangements; Testing arrangements in general | H04R 29/00 |
| Ornaments for ears | A44C 7/00 |
| Earphones measuring physiological sounds, e.g. heartrate, breathing, pulse | A61B 5/02 |
| Devices or methods enabling ear patients to replace direct auditory perception | A61F 11/04 |
| Internal protective devices for the ears, e.g. earplugs | A61F 11/08 |
| Non-electric hearing aids | A61F 11/30 |
| Structural combination of hearing aids with spectacle frames | G02C 11/06 |
| Teaching or communicating with deaf persons | G09B 21/009 |

Informative references

| | |
|---|------------------------------|
| Directing sound using electrical steering of transducer arrays, e.g. beam steering | G10K 11/34 |
| Coding or decoding of speech or audio signal, using source filter models or psychoacoustic analysis | G10L 19/00 |
| Processing of speech signals | G10L 21/00 |
| Automatic gain control in audio amplifiers | H03G 3/3005 |
| Telephone sets for the hearing impaired | H04M 1/2475 |
| Mobile telephones for the hearing impaired | H04M 1/72478 |

Special rules of classification

- Classification should be directed to groups, [H04R 25/02](#), [H04R 25/04](#) and [H04R 25/50](#) and its subgroups, if and only if the technical subject in consideration cannot be classified elsewhere under this main group.
- Concerning inventions relating to hearing devices, if an application describes and shows the invention using only embodiments relating to hearing aids then [H04R 25/00](#) or subgroups should be given as invention information. Dependent on the case, the mere statement that the invention is also applicable to ear- or headphones may render classification under [H04R 1/10](#) or [H04R 5/033](#) useful, but only as additional information. Only if specific non-trivial embodiments for ear- or headphones are also shown, classification under [H04R 1/10](#) or [H04R 5/033](#) as invention information may be considered as well.
- Further details are covered by Indexing groups [H04R 2225/31](#), [H04R 2225/33](#), [H04R 2410/07](#), [H04R 2430/03](#), [H04R 2460/03](#), [H04R 2460/13](#) and [H04R 2460/17](#). Classification is obligatory.

Glossary of terms

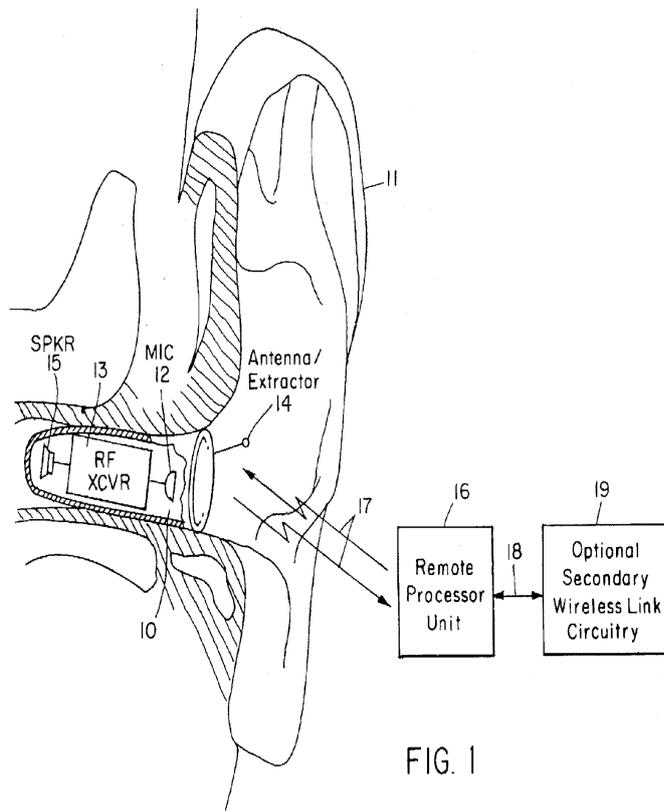
In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---|---|
| Electro-acoustic or electro-mechanical hearing aids | hearing aids acting indirectly, e.g. acoustically, or directly on the ear drum, mastoid, ossicles or cochlea and providing an auditory perception |
| Monitoring | encompasses indication |

H04R 25/04**comprising pocket amplifiers****Definition statement**

This place covers:

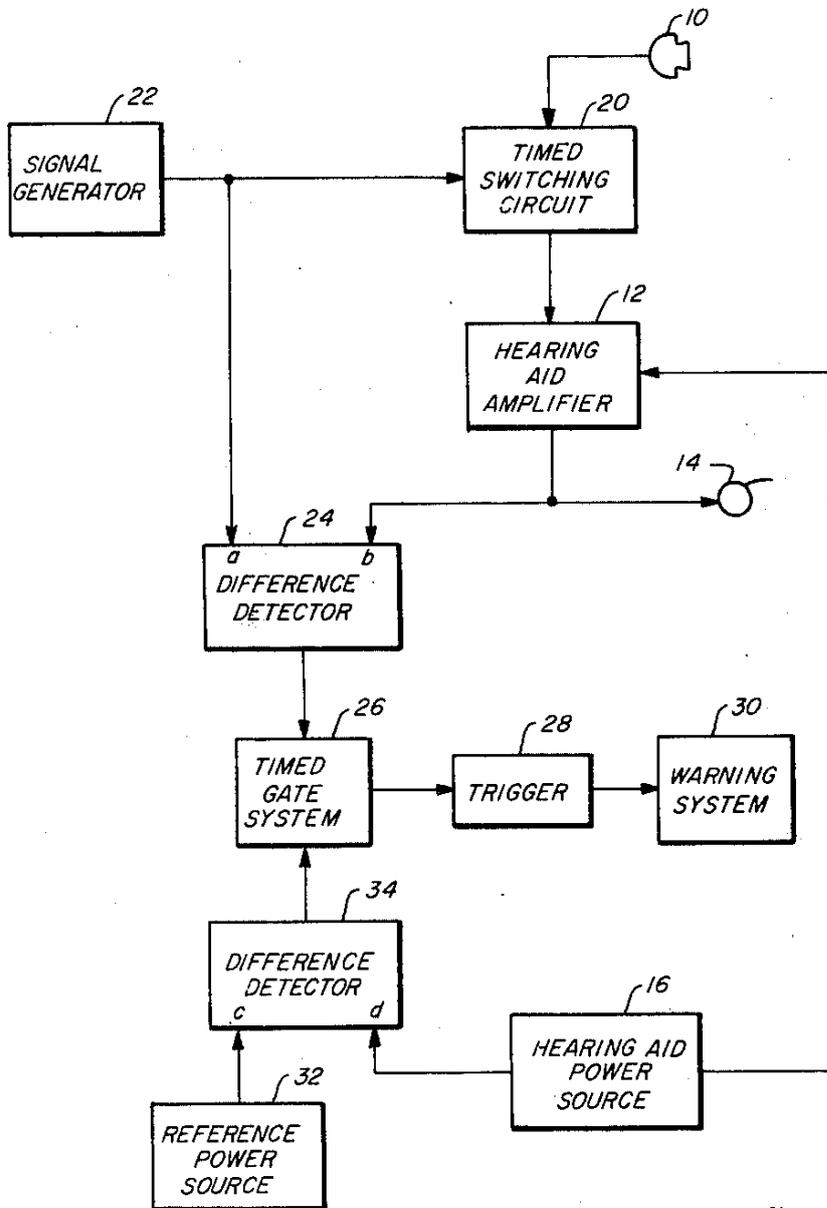
The signal processing is done external to the hearing aid part that is in the ear (as for example shown in the figure)

**H04R 25/30****{Monitoring or testing of hearing aids, e.g. functioning, settings, battery power}****Definition statement**

This place covers:

For example testing of the functioning of an amplifier in a hearing aid (see figure). Switching circuit 20 measures a time period T , and interrupts the signal from the microphone 10 once every such period T . The interruption, or test time interval, lasts for another measured time segment t where t is less than T . During the interruption, the switching circuit 20 transmits the signal from the signal generator 22 to

the hearing aid amplifier 12 to act as a test signal. Difference detector 24 detects malfunction of the amplifier. Difference detector 34 low battery status.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Testing arrangements for electro-acoustic transducers in general | H04R 29/00 |
| Testing arrangements for cochlear implants | A61N 1/08 |
| Battery testing in general | G01R 31/36 |
| Indicators for indicating switching condition | H01H 9/16 |

For example: US4049930.

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2460/15](#). Classification is obligatory.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------------|-----------------------------|
| Monitoring | also encompasses indicating |
|------------|-----------------------------|

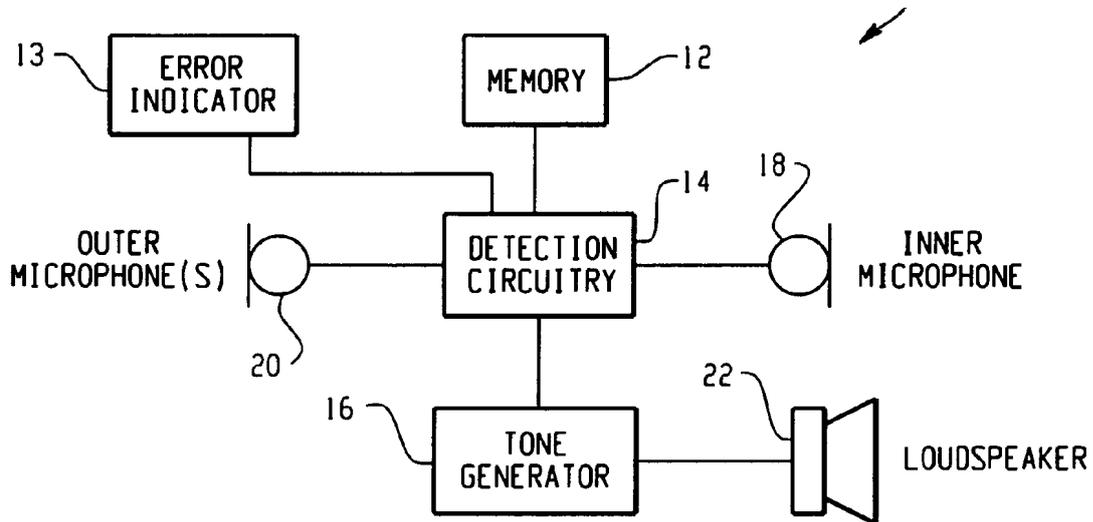
H04R 25/305

{Self-monitoring or self-testing}

Definition statement

This place covers:

Example of a self-diagnosis system with which the transducers and other component can be checked, see figure.



Special rules of classification

Further detail is covered by Indexing Code subgroup [H04R 2225/39](#). Classification is obligatory.

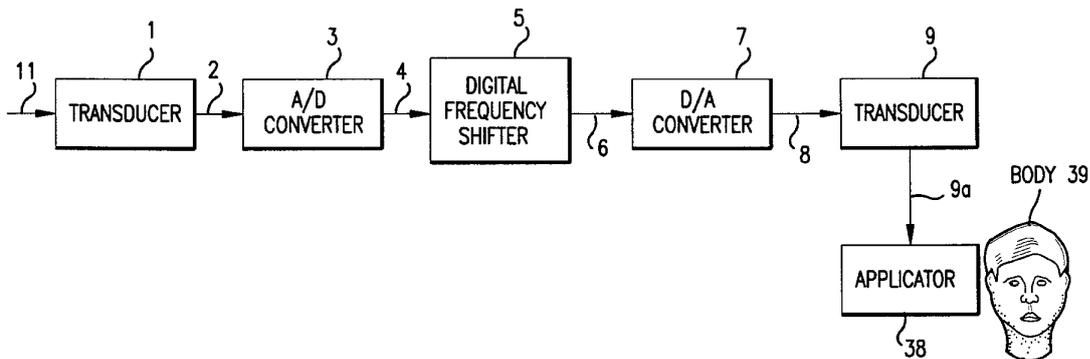
H04R 25/353

{Frequency, e.g. frequency shift or compression}

Definition statement

This place covers:

For example:



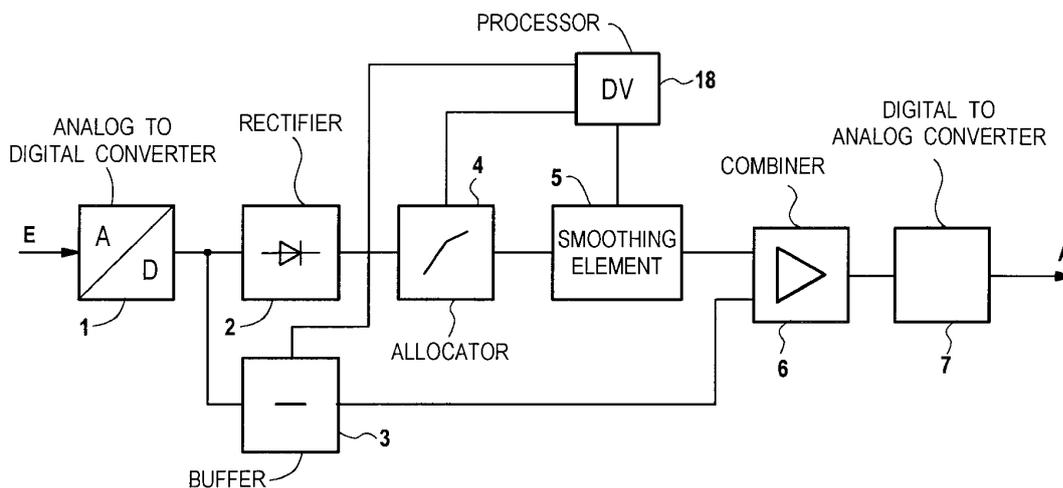
H04R 25/356

{Amplitude, e.g. amplitude shift or compression}

Definition statement

This place covers:

For example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Compression/ expansion | H03G 7/00 |
| Frequency-dependent volume compression or expansion in general, e.g. multiple-band systems | H03G 9/025 |

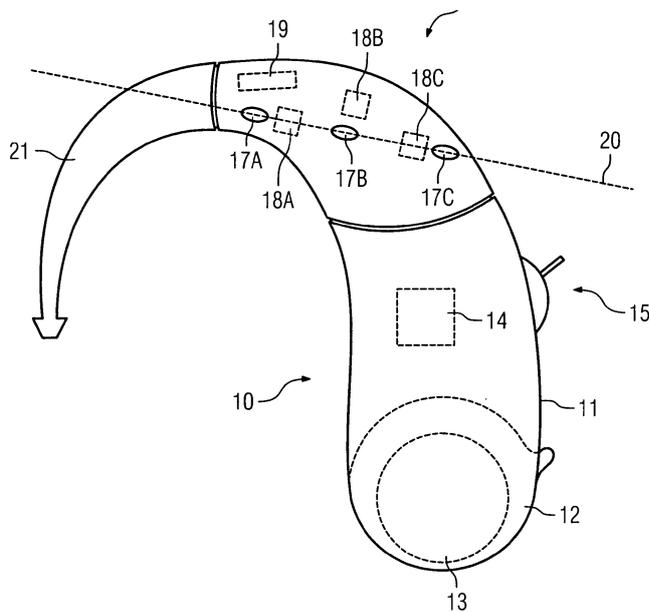
H04R 25/402**{using contructional means}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

| | |
|--|---------------------------|
| Obtaining a desired directivity characteristic using constructional means in general | H04R 1/32 |
|--|---------------------------|

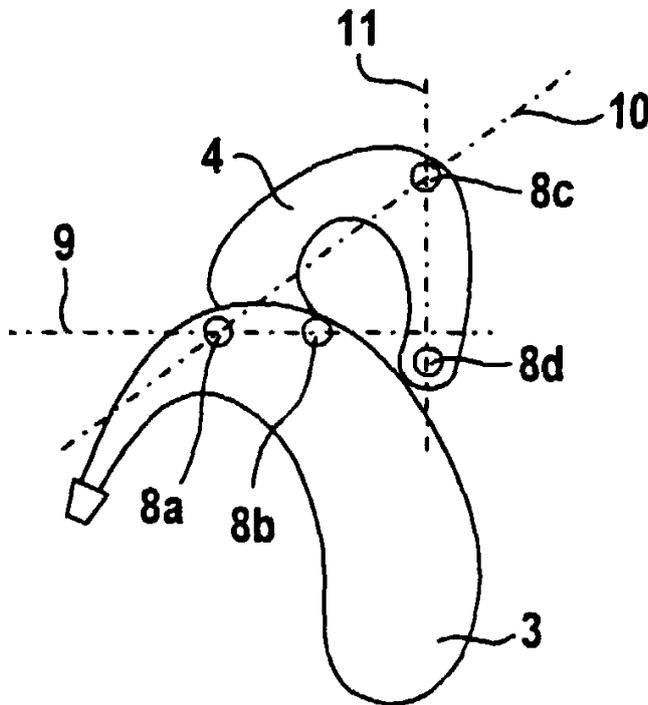
H04R 25/405**{by combining a plurality of transducers}****Definition statement***This place covers:*

Mechanical aspects, e.g. orientation, relative placement, of acoustic transducers in hearing aids to obtain a desired directional characteristic.

For example microphone openings (17A-17C) arranged along a straight line (see figure):



For example microphones (8a,8b) mounted in a BTE housing and additional microphones (8c, 8d) mounted in a lever (4) which can be swung away from the housing to adapt the directivity of the hearing aid.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------|
| Arrangements for obtaining a desired directional characteristic by combining a number of identical acoustic transducers | H04R 1/40 |
|---|---------------------------|

Special rules of classification

The mere fact that more than one microphone is used to obtain a desired directivity need not be classified, especially if [H04R 25/407](#) has to be given anyway (cf. the first 2 EXAMPLES given for [H04R 25/407](#)).

Further detail is covered by Indexing Code group [H04R 2410/01](#). Classification is obligatory.

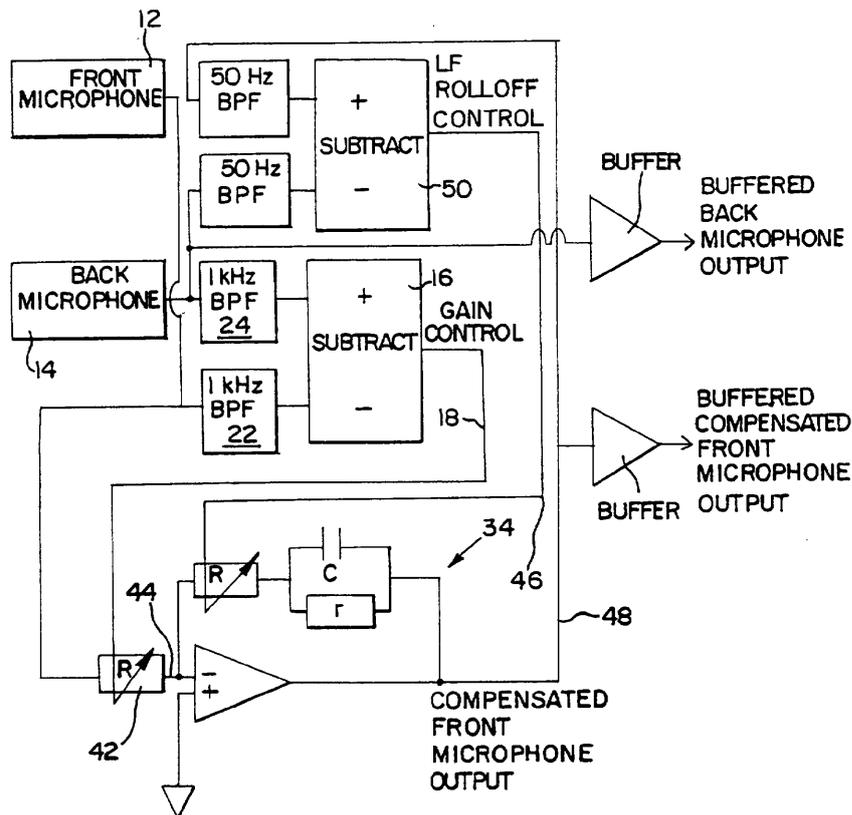
H04R 25/407

{Circuits for combining signals of a plurality of transducers}

Definition statement

This place covers:

For example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Circuits for combining signals of a plurality of acoustic transducers in general | H04R 3/005 ; H04R 3/12 |
| Direction-finders for determining the direction from which infrasonic, sonic, ultrasonic, not having a directional significance, are being received | G01S 3/80 |
| Systems for determining distance or velocity not using reflection or re-radiation and using ultrasonic, sonic, or infrasonic waves | G01S 11/14 |
| Circuits for sound-focusing or directing using electrical steering of transducer arrays, e.g. beam steering | G10K 11/34 |
| Speech recognition techniques specially adapted for robustness in adverse environments | G10L 15/20 |
| Speech enhancement using two microphones, one receiving mainly the noise signal and the other one mainly the speech signal | G10L 2021/02165 |
| Speech enhancement using microphone arrays or beamforming | G10L 2021/02166 |
| Telephonic conference arrangements | H04M 3/56 |

| | |
|--------------------------|---------------------------|
| Video conference systems | H04N 7/15 |
|--------------------------|---------------------------|

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2410/01](#) and [H04R 2430/20](#) listed below. Classification is obligatory.

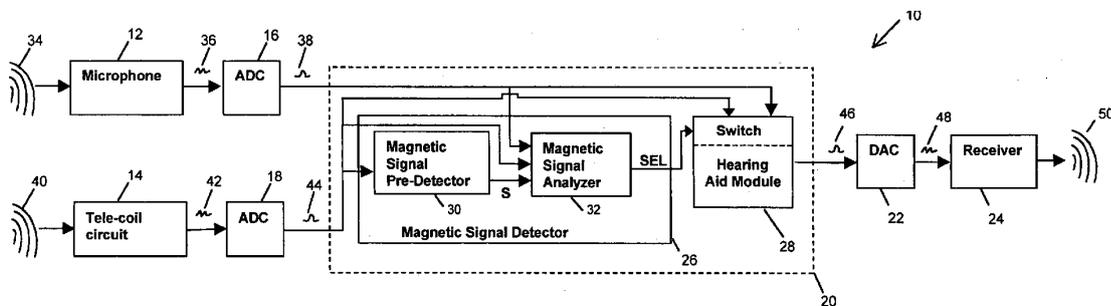
H04R 25/43

{Electronic input selection or mixing based on input signal analysis, e.g. mixing or selection between microphone and telecoil or between microphones with different directivity characteristics ([H04R 25/407](#) takes precedence)}

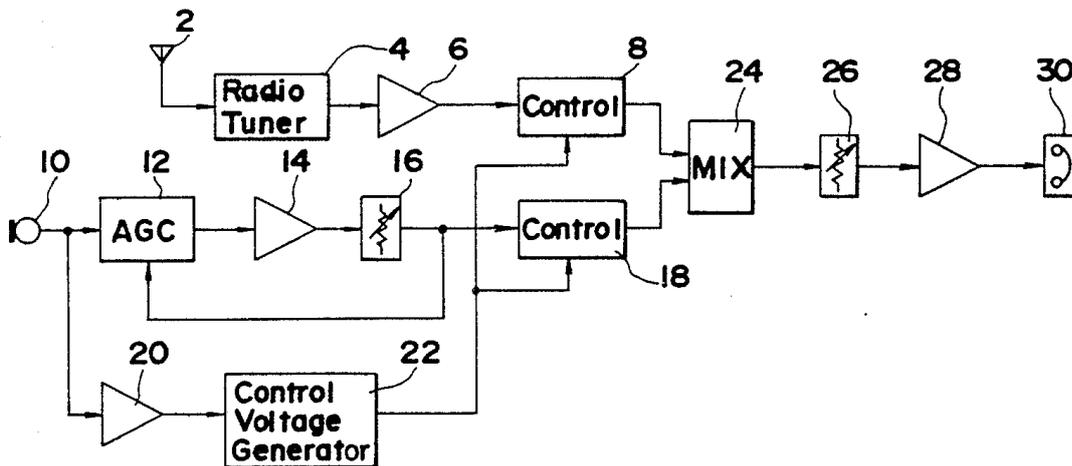
Definition statement

This place covers:

Example for input selection:



Example for mixing:



H04R 25/453

{electronically}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---------------------------|
| Prevention of acoustic reaction in general | H04R 3/02 |
|--|---------------------------|

H04R 25/456**{mechanically}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

| | |
|--|------------------------------|
| Mounting and assembly of hearing aids | H04R 25/60 |
| Housing parts, e.g. shells, tips or moulds | H04R 25/65 |
| Aspects relating to vents in hearing devices | H04R 2460/11 |

H04R 25/48**{using constructional means for obtaining a desired frequency response
([H04R 25/652](#) takes precedence)}****References****Limiting references***This place does not cover:*

| | |
|----------------------|-----------------------------|
| Ear tips; Ear moulds | H04R 25/652 |
|----------------------|-----------------------------|

Informative references*Attention is drawn to the following places, which may be of interest for search:*

| | |
|--|---------------------------|
| Constructional means for obtaining a desired frequency response in general | H04R 1/22 |
|--|---------------------------|

H04R 25/50**{Customised settings for obtaining desired overall acoustical characteristics}****Definition statement***This place covers:*

General analog or digital signal processing in hearing aid not provided for in [H04R 25/00](#) or its subgroups.

Special rules of classification

- Classification should be directed to this group and its subgroups, if and only if the technical subject in consideration cannot be classified elsewhere under this main group
- Inventions relating to the interaction of analogue and digital signal processing are to be classified here in combination with both [H04R 25/502](#) and [H04R 25/505](#) as additional information.
- Further detail is covered by Indexing Code subgroups [H04R 2225/41](#), [H04R 2225/49](#), [H04R 2225/49](#), [H04R 2460/01](#), [H04R 2460/05](#), [H04S 2420/01](#) and [H04S 2420/05](#). Classification is obligatory.

H04R 25/55

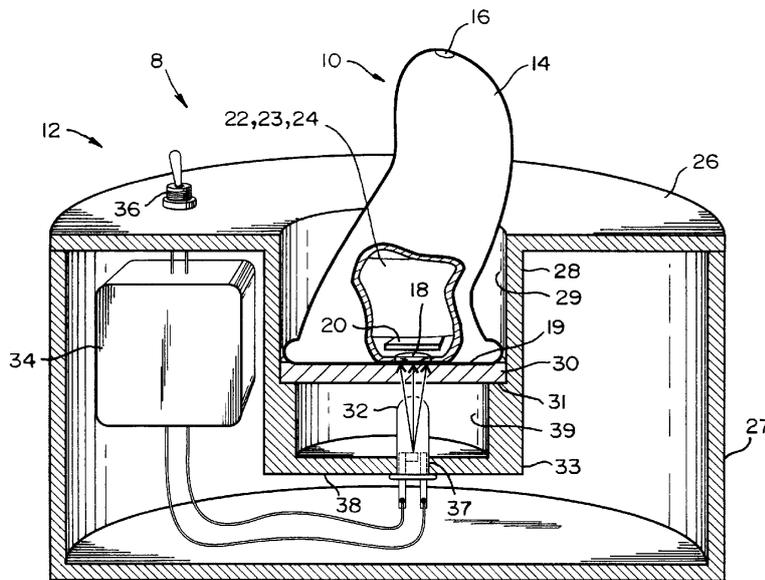
{using an external connection, either wireless or wired}

Definition statement

This place covers:

External connection for the purpose of data exchange between hearing aids, e.g. binaural hearing aids, or between hearing aid and external device, e.g. telecoil, remote control, or for charging of batteries in hearing aids

Example for wirelessly charging accumulators in a hearing aid (see figure)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Transmission systems in which the medium consists of the human body | H04B 13/00 |
|---|----------------------------|

Special rules of classification

- If battery charging is wireless only [H04R 25/55](#) is to be given in combination with [H04R 2225/31](#). If however charging is wired [H04R 25/556](#) (as additional information) is to be added as well.
- Further detail is covered by subgroups [H04R 2225/51](#), [H04R 2225/53](#), [H04R 2225/55](#) and [H04R 2460/07](#). Classification is obligatory.

H04R 25/552

{Binaural}

Definition statement

This place covers:

Binaural control, e.g. control of one hearing aid in dependence of the other; Data exchange between hearing aids to enable binaural control, e.g. type of data, timing, ...

Special rules of classification

The mere fact that binaural control of data exchange is wired or wireless needs not be classified.

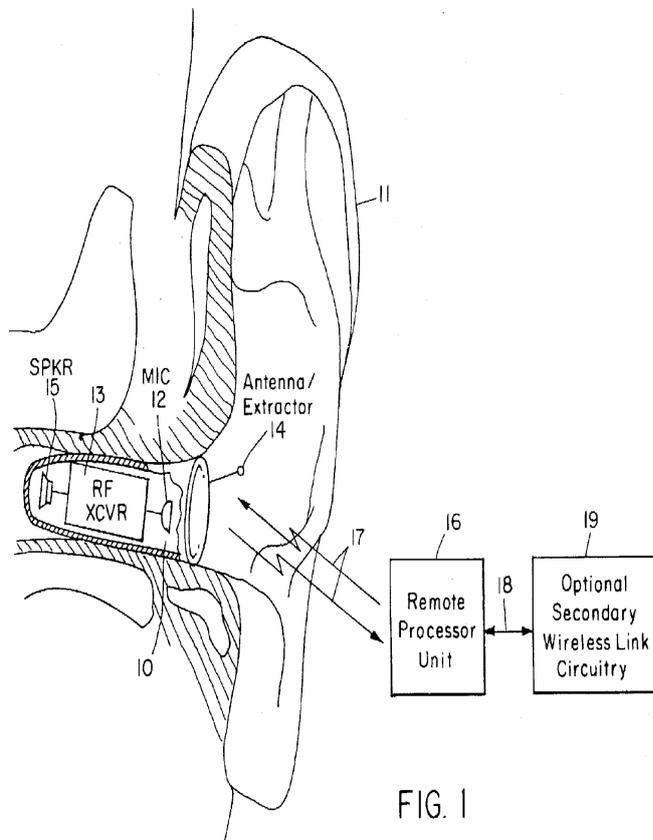
H04R 25/554

{using a wireless connection, e.g. between microphone and amplifier or using Tcoils}

Definition statement

This place covers:

Electric hearing aids using wireless connection for the transmission audio representative data, e.g. T-coils, FM receivers (see e.g. the figure below)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Wireless connection in general | H04R 2420/07 |
| Near field transmission in general | H04B 5/00 |
| Transmission systems in which the medium consists of the human body | H04B 13/005 |
| Non-intrusive coupling means between telephone set and auxiliary equipment | H04M 1/215 |

Special rules of classification

Binaural hearing aids (invention) are not to be classified in this group but in [H04R 25/552](#). No classification in [H04R 25/554](#) (as invention of additional information) is in principle needed.

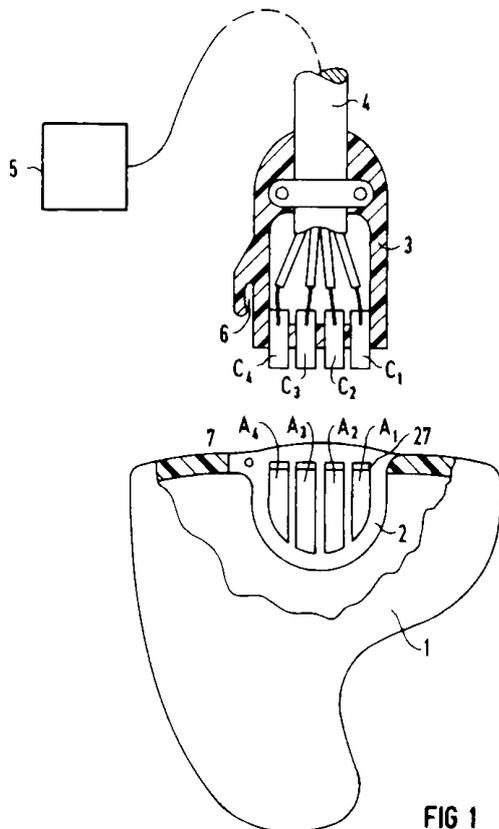
H04R 25/556

{External connectors, e.g. plugs or modules ([H04R 25/607](#) takes precedence)}

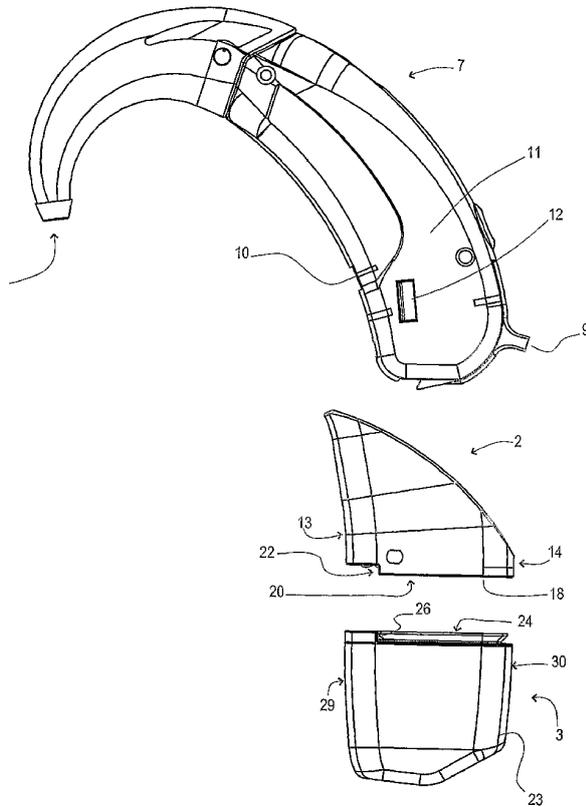
Definition statement

This place covers:

Example for an ITE hearing aid connected to a programmer (5):



Example for a BTE hearing aid additionally provided with an FM receiver (3):



References

Limiting references

This place does not cover:

| | |
|----------|-----------------------------|
| Earhooks | H04R 25/607 |
|----------|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Local control of medical devices, e.g. graphical user interfaces, dedicated hardware interfaces | G16H 20/00 |
| Connectors in general | H01R |

Special rules of classification

Connection between the BTE housing and the earmould via an earhook is not to be classified here but in [H04R 25/60](#) in combination with [H04R 2225/0213](#).

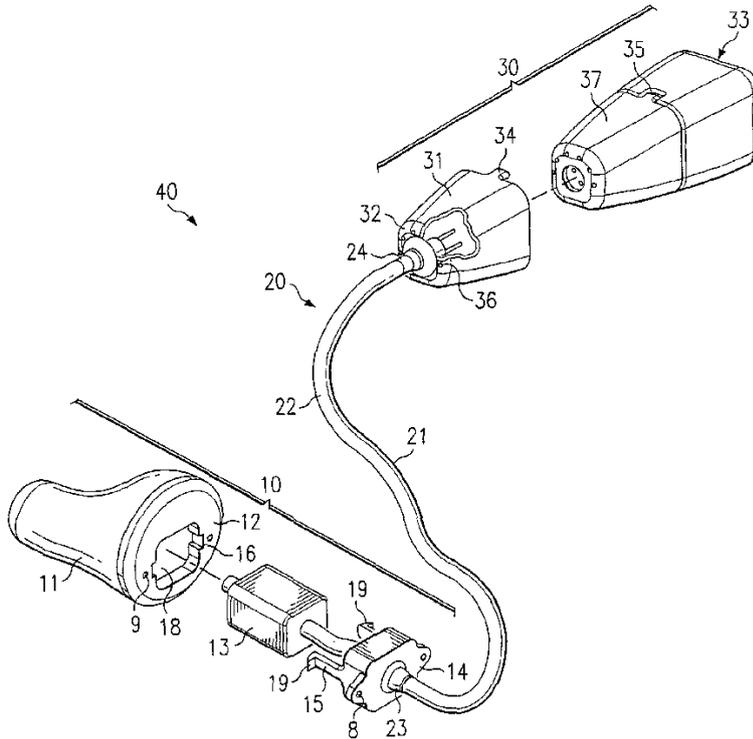
H04R 25/558**{Remote control, e.g. of amplification, frequency}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

| | |
|--|------------------------------|
| Telemetry systems for implants such as pace makers or cochlear implants | A61N 1/37211 |
| Input or output devices integrated in time-pieces | G04G 21/00 |
| Remote control in general | G05F |
| Audio-frequency transformers or mutual inductances, i.e. not suitable for handling frequencies considerably beyond the audio range | H01F 19/02 |
| Indicators for indicating switching condition | H01H 9/16 |
| Remote control of amplification, tone, or bandwidth | H03G 1/02 |
| Combined remote-control of tuning and other functions, e.g. brightness, amplification | H03J 9/00 |
| remote control, e.g. for HiFi systems or audio/video combinations | H04B 1/20 |
| Hi-Fi systems or audio/video combinations | H04B 1/202 |

H04R 25/60**{Mounting or interconnection of hearing aid parts, e.g. inside tips, housings or to ossicles (ear wax retarders, e.g. mounting thereof [H04R 25/654](#))}****Definition statement***This place covers:*

Arrangements for mounting or interconnection of hearing aid parts.

Example: Details of mounting of ear tip (11) via tube (21 to BTE housing (30):



References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Ear wax retarders, e.g. their mounting | H04R 25/654 |
|--|-----------------------------|

Special rules of classification

Further detail is covered by Indexing Code subgroups [H04R 2225/0213](#), [H04R 2225/49](#), [H04R 2225/59](#), [H04R 2225/61](#), and [H04R 2225/67](#). Classification is obligatory.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|-----------------|--|
| Interconnection | covers both mechanical as well as electrical interconnection |
|-----------------|--|

H04R 25/602

{of batteries}

Definition statement

This place covers:

Arrangements for mounting or interconnection of batteries in hearing aids

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Electrical supply for implants, e.g. pace makers or cochlear implants | A61N 1/378 |
| Secondary cells; Manufacture thereof, Details, Construction or manufacture in general, small-sized flat cells or batteries portable equipment | H01M 10/0436 |
| Primary casings, jackets or wrappings of a single cell or a single battery | H01M 50/10 |
| Mountings; Secondary casings or frames; Racks, modules or packs; Suspension devices; Shock absorbers; Transport or carrying devices; Holders | H01M 50/20 |
| Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries | H02J 7/00 |

H04R 25/604

{of acoustic or vibrational transducers}

Definition statement

This place covers:

Arrangements for mounting or interconnection of transducers in hearing aids

H04R 25/606

{acting directly on the eardrum, the ossicles or the skull, e.g. mastoid, tooth, maxillary or mandibular bone, or mechanically stimulating the cochlea, e.g. at the oval window}

Definition statement

This place covers:

Mounting or interconnection aspects of implantable hearing aid transducers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Earphones or headphones using bone-conduction transducers | H04R 1/10 , H04R 5/033 |
| Constructions of transducers per se | H04R 9/00 - H04R 23/00 |
| Implantable hearing aids or parts thereof | H04R 2225/67 |
| Electrode placement of cochlear implants | A61N 1/0541 |
| Controlling aspects of cochlear implants | A61N 1/36036 |
| Electrical supply for implants | A61N 1/378 |

H04R 25/609

{of circuitry (of electronic switches or control elements [H04R 25/603](#))}

Definition statement

This place covers:

Interconnection or mounting of electrical aspects of implantable hearing aid transducers

References**Limiting references**

This place does not cover:

| | |
|--|-----------------------------|
| of electronic switches or control elements | H04R 25/603 |
|--|-----------------------------|

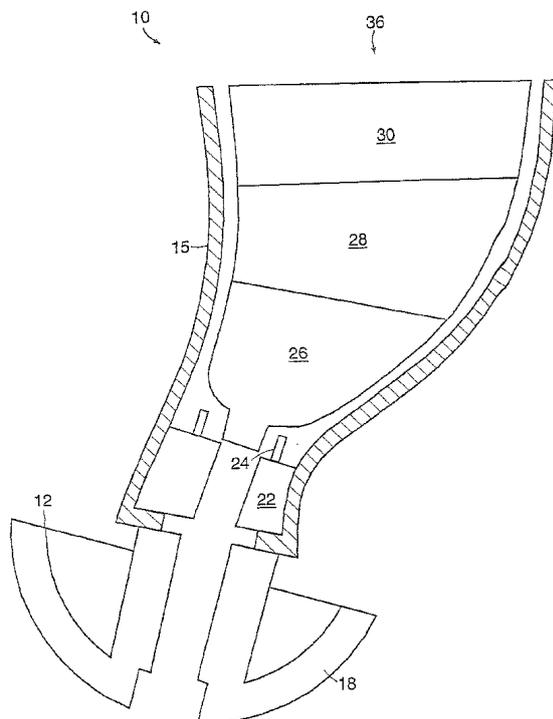
H04R 25/65

{Housing parts, e.g. shells, tips or moulds, or their manufacture}

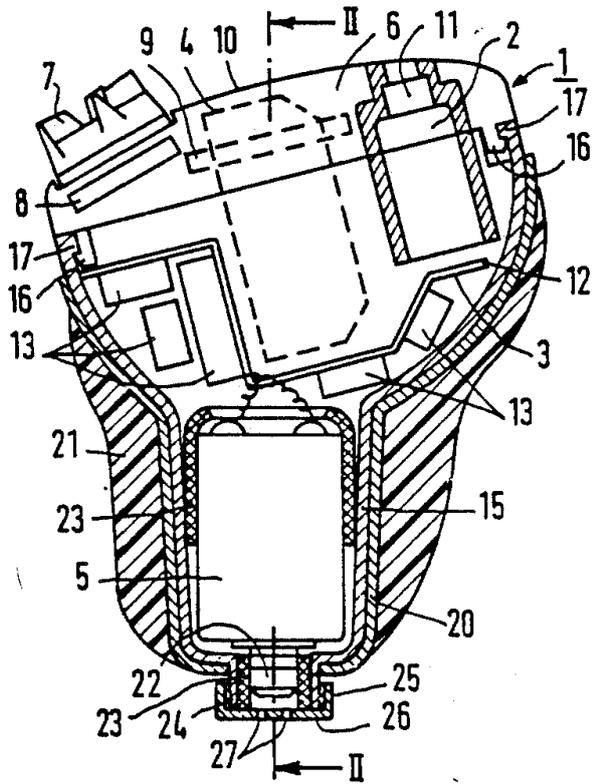
Definition statement

This place covers:

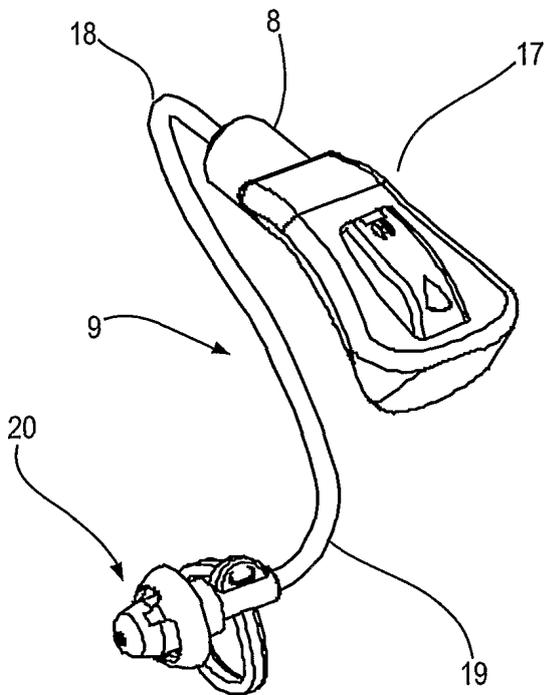
Example CIC: housing (15) and ear tip (18)



Example ITE: housing (15) and ear mould (21)



Example BTE: housing (17) and ear tip (20).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| Constructional arrangements, e.g. casings, for implants | A61N 1/375 |
| Storage case for drying purposes | F26B 9/003 |
| Housing specially adapted for small components | H05K 5/0091 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2225/77](#). Classification is obligatory.

H04R 25/652

{Ear tips; Ear moulds (hybrid ear moulds or post-processing thereof for their customisation [H04R 25/659](#))}

Definition statement

This place covers:

For examples, please see [H04R 25/65](#).

References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Hybrid ear moulds or post-processing thereof for their customisation | H04R 25/659 |
|--|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Earpieces of the intra-aural type | H04R 1/1016 |
| Measuring physical dimensions, e.g. size of the entire body or parts thereof | A61B 5/107 |
| Earplugs for protection | A61F 11/08 |
| Computer-aided design | G06F 30/00 |
| Three dimensional (3D) modelling, e.g. data description of 3D objects | G06T 17/00 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2460/09](#) and [H04R 2460/11](#). Classification is obligatory.

H04R 25/654

{Ear wax retarders}

Definition statement

This place covers:

Means for protecting electric components, e.g. receivers, microphones, in hearing aids against e.g. earwax, oil, moisture, debris, and other foreign material; Their mounting or interconnection

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Screens for loudspeakers | H04R 1/023 |
| Protective screens for microphones, e.g. all weather or wind screens | H04R 1/086 |
| Mounting or interconnection of hearing aid parts in general, e.g. inside tips, housing or to ossicles | H04R 25/60 |

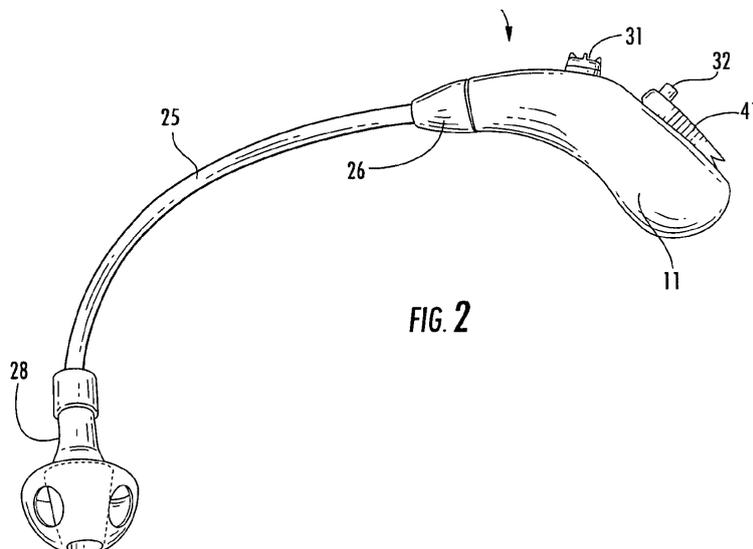
H04R 25/656

{Non-customized, universal ear tips, i.e. ear tips which are not specifically adapted to the size or shape of the ear or ear canal}

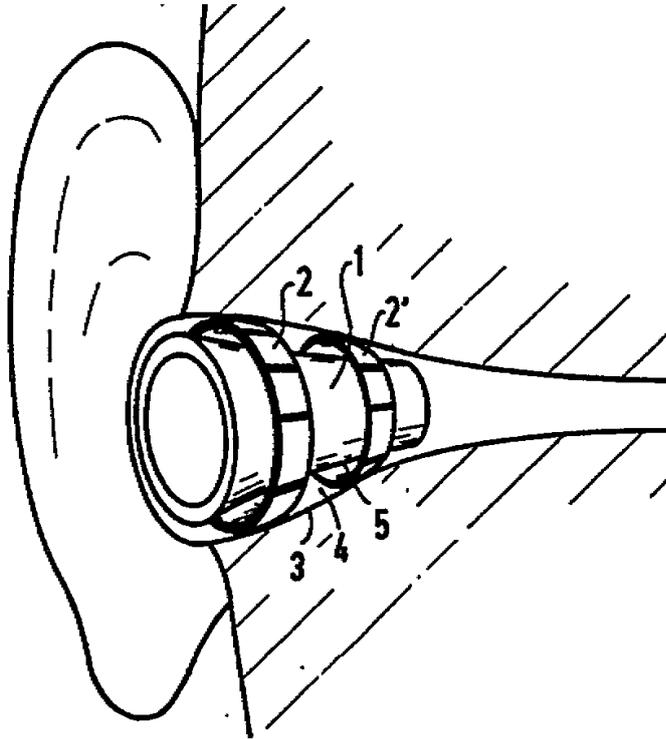
Definition statement

This place covers:

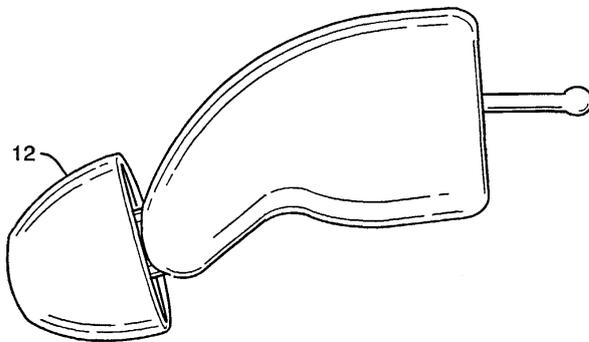
Example BTE:



Example ITE:



Example CIC:



H04R 25/658

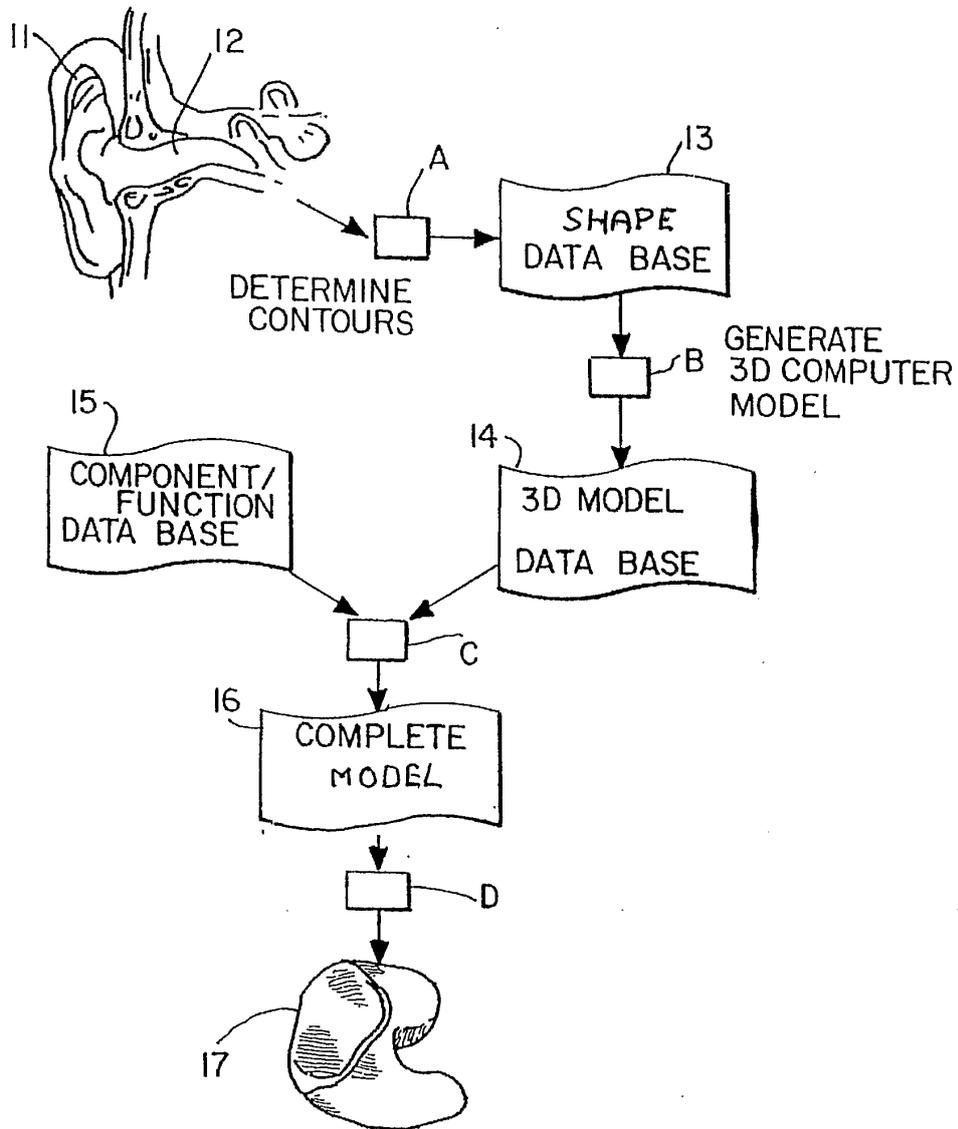
{Manufacture of housing parts}

Definition statement

This place covers:

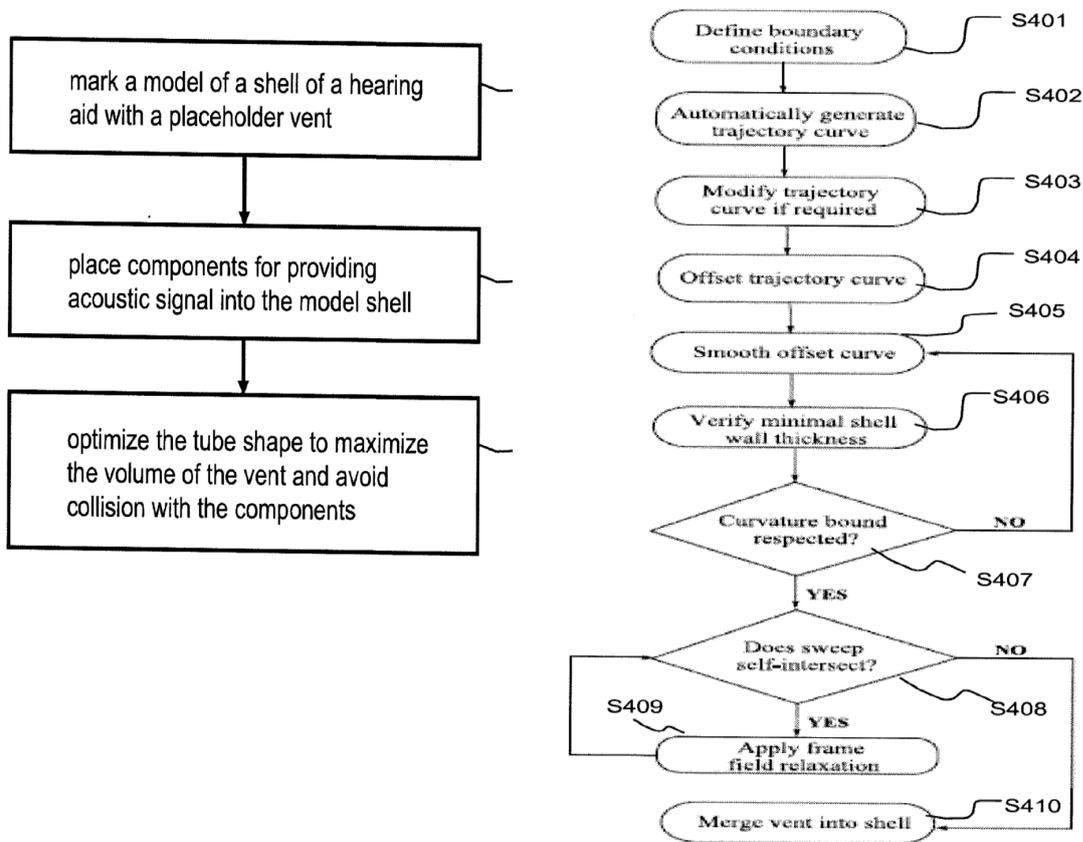
Aspects of design and manufacturing of housing parts

Example of design and subsequent manufacture of ear mould:



Definition statement

Example of design of a vent in a hearing aid shell (left-hand figure: general modelling and right-hand figure a method for optimising the shape of the vent)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------------------------|--|
| Moulding of plastics | B29C 43/00 , B29C 45/00 , B29C 48/00 , B29C 49/00 |
| Shaping of plastics in general | B29C 67/00 |

H04R 25/70

{Adaptation of deaf aid to hearing loss, e.g. initial electronic fitting}

Definition statement

This place covers:

Electronic adaptation of the hearing aid settings in response to audiological test signals to compensate for hearing aid loss or changes therein, i.e. initial or subsequent fitting.

Initial fitting is generally carried out by an acoustician. Subsequent fitting can be carried out by the acoustician or by the user, e.g. with audiological test signals generated in the hearing aid.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Ear tip or ear moulds for hearing aids | H04R 25/652 |
| Audiometry | A61B 5/12 |

Special rules of classification

Further detail is covered by Indexing Code subgroups [H04R 2225/39](#), [H04R 2225/81](#) and [H04R 2225/83](#). Classification is obligatory.

H04R 25/75

{Electric tinnitus maskers providing an auditory perception}

Definition statement

This place covers:

Electric tinnitus maskers providing an auditory perception e.g. an acoustic noise signal around the tinnitus frequency. The tinnitus maskers can be stand-alone devices or can be integrated in a hearing aid.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Evaluating tinnitus | A61B 5/128 |
| Devices or methods to cause a change in the state of consciousness | A61M 21/00 |
| Masking sound in general | G10K 11/175 |

H04R 27/00

Public address systems (circuits for preventing acoustic reaction [H04R 3/02](#); circuits for distributing signals to loudspeakers [H04R 3/12](#); {monitoring or testing arrangements for public address systems [H04R 29/007](#)}; amplifiers [H03F](#))

Definition statement

This place covers:

Audio distribution systems for buildings, e.g. stations or religious facilities, for venues, e.g. in stadiums or in concert halls, or for domestic use, i.e. multiroom.

Public address systems for buildings, e.g. stations or religious facilities, for open air, for indoor and outdoor venues, e.g. in stadiums or in concert halls, or for domestic use, i.e. multiroom.

References

Limiting references

This place does not cover:

| | |
|---|---------------------------|
| Circuits for preventing acoustic reaction | H04R 3/02 |
|---|---------------------------|

| | |
|---|-----------------------------|
| Monitoring or testing arrangements for public address systems | H04R 29/007 |
|---|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| Circuits for distributing signals to loudspeakers in general | H04R 3/12 |
| Audible signalling systems and audible personal calling systems | G08B 3/00 |
| Audible advertising | G09F 25/00 |
| Combined visual and audible advertising or displaying, e.g. for public address | G09F 27/00 |
| Speech enhancement, e.g. noise reduction, echo cancellation in public address systems | G10L 21/0208 |
| Installations of electric cables or lines in or on buildings or equivalent structures | H02G 3/00 |
| Amplifiers | H03F |
| Powerline communication in general | H04B 3/54 |
| Audio/video applications of powerline communications | H04B 2203/545 |
| Broadcasting | H04H |

Special rules of classification

Further detail is covered by the subgroups of Indexing Code group [H04R 2227/00](#) and by Indexing Code groups [H04R 2420/05](#) and [H04R 2430/03](#). Classification is obligatory.

H04R 27/02

Amplifying systems for the deaf

Definition statement

This place covers:

Inductive loop or similar systems to enable communication with the hard of hearing.

References

Limiting references

This place does not cover:

| | |
|---|------------------------------|
| Electric hearing aids | H04R 25/00 |
| Cochlear implants | A61N 1/36036 |
| Teaching or communicating with deaf persons | G09B 21/009 |

H04R 29/00

Monitoring arrangements; Testing arrangements {(for hearing aids [H04R 25/30](#); detection of loudspeaker connection [H04R 5/04](#); sound-field adaptation dependent on speaker detection [H04S 7/308](#))}

Definition statement

This place covers:

- Monitoring or testing arrangements for transducers, loudspeakers, microphones or public address systems;
- Testing of transducer, loudspeaker or microphone connection
- Visual indication of acoustic signal levels.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|----------------------------|
| Detection of loudspeaker or microphone connection for stereophonic purposes | H04R 5/04 |
| Monitoring or testing of hearing aids | H04R 25/30 |
| Circuits or components specially adapted for stereophonic broadcast systems | H04H 20/47 |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Measurement of mechanical vibrations or ultrasonic, sonic or infrasonic waves, e.g. sound dosimeter | G01H |
| Testing of electronic circuits in household appliances or professional audio/video equipment | G01R 31/2825 |
| Sound-field adaptation dependent on speaker detection | H04S 7/308 |

Special rules of classification

Further detail is covered by the subgroup of Indexing Code groups [H04R 2420/05](#) and [H04R 2430/03](#). Classification is obligatory.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------------|------------------------|
| Monitoring | encompasses indication |
|------------|------------------------|

H04R 29/001

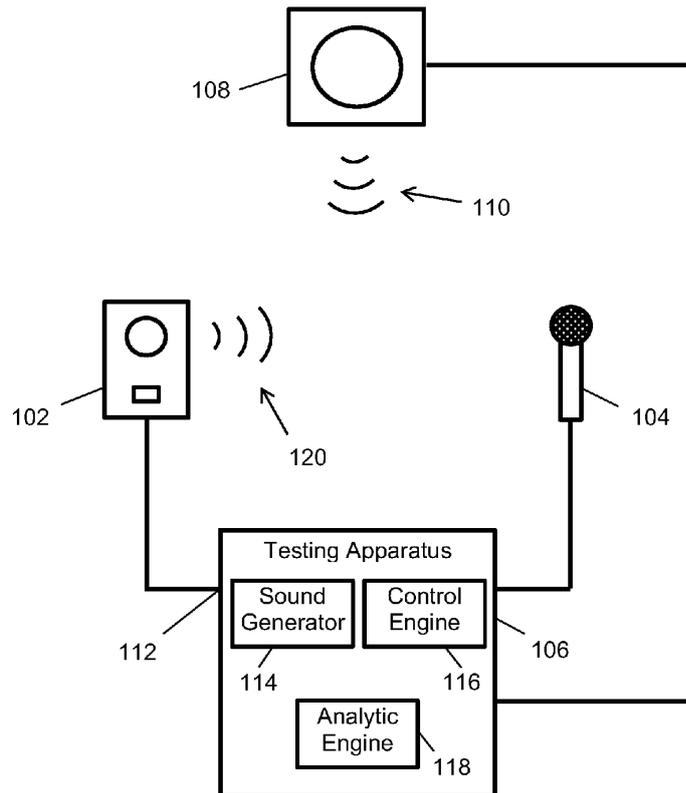
{for loudspeakers ([H04R 29/007](#) takes precedence)}

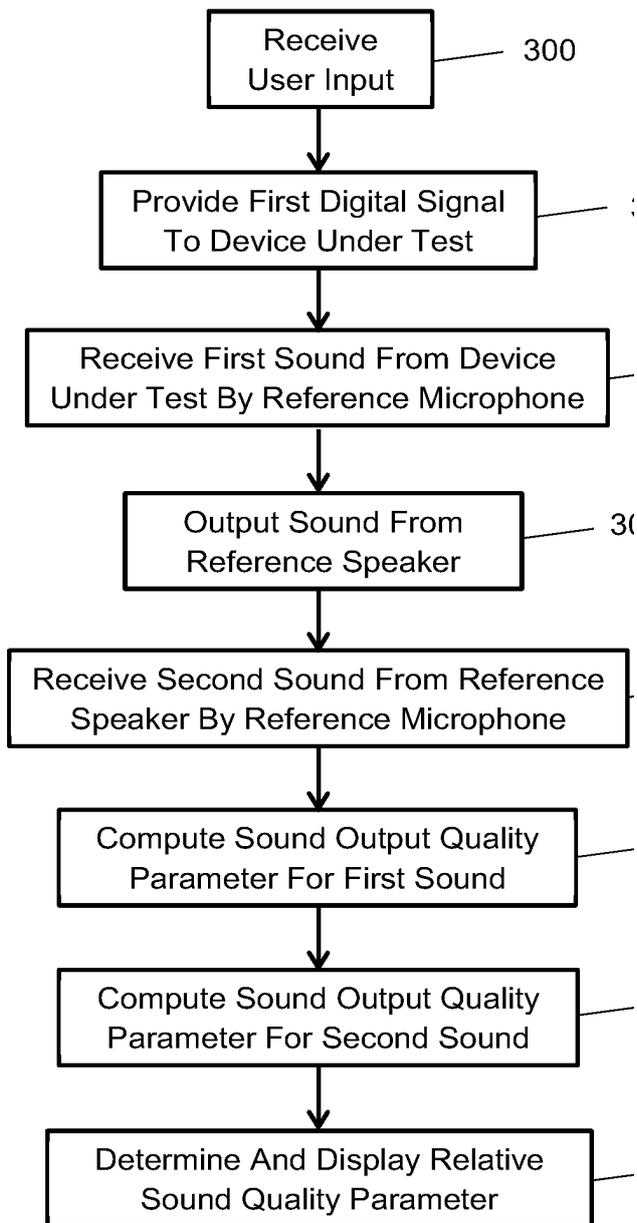
Definition statement

This place covers:

Loudspeaker 102 the one under test is in the exemplary figures below.

Loudspeaker 108 is the reference loudspeaker.





References

Limiting references

This place does not cover:

| | |
|---|-----------------------------|
| Testing or monitoring arrangements for public address systems | H04R 29/007 |
|---|-----------------------------|

Informative references

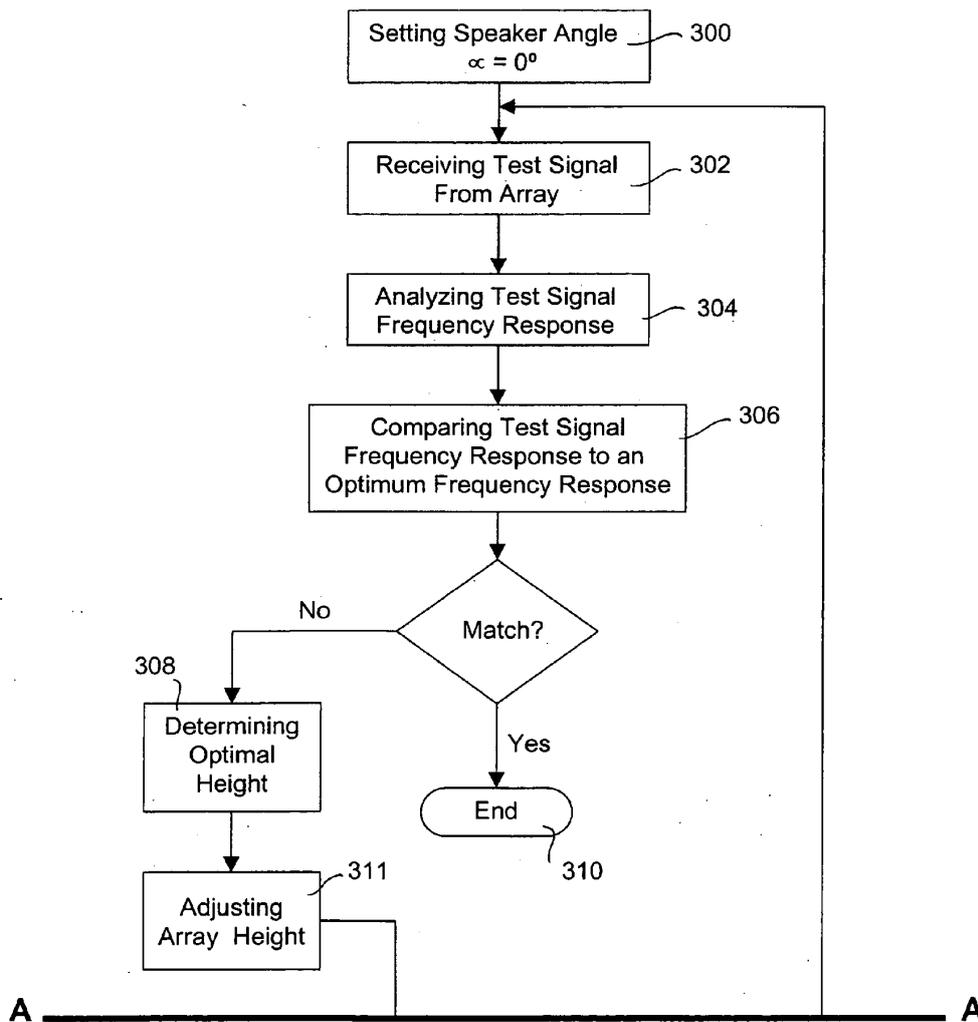
Attention is drawn to the following places, which may be of interest for search:

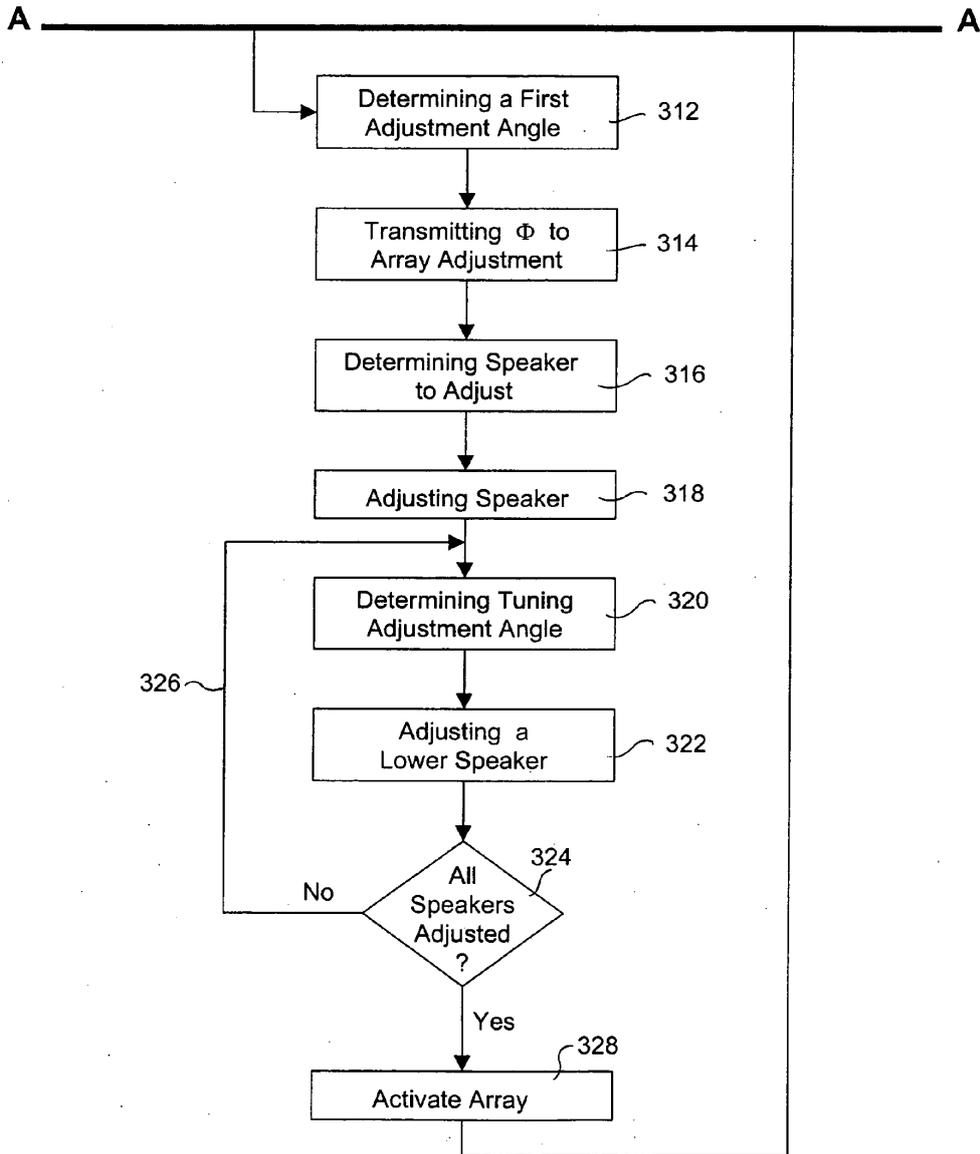
| | |
|---|----------------------------|
| Signal processing adapting stereophonic sound system to listener position | H04S 7/302 |
|---|----------------------------|

H04R 29/002**{Loudspeaker arrays}****Definition statement**

This place covers:

As an illustrative example:





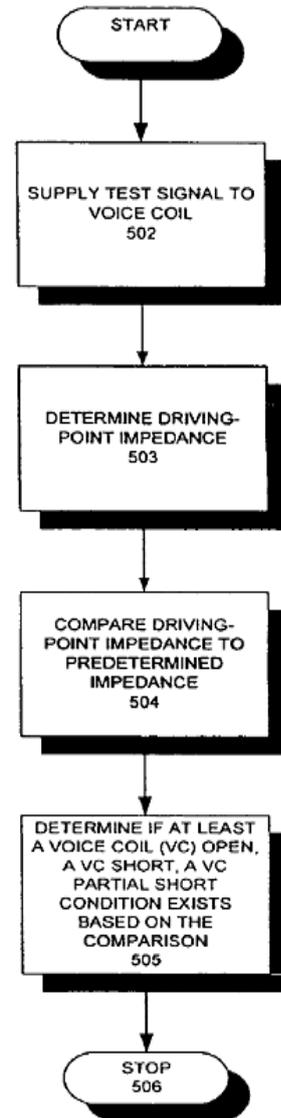
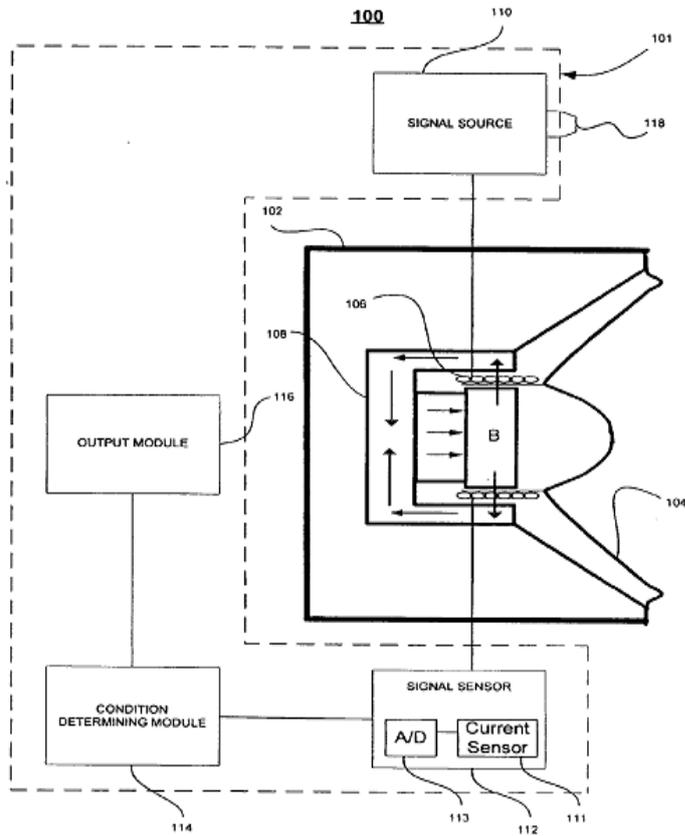
H04R 29/003

{of the moving-coil type}

Definition statement

This place covers:

For example:



H04R 29/004

{for microphones ([H04R 29/007](#) takes precedence)}

Definition statement

This place covers:

Example for test method:

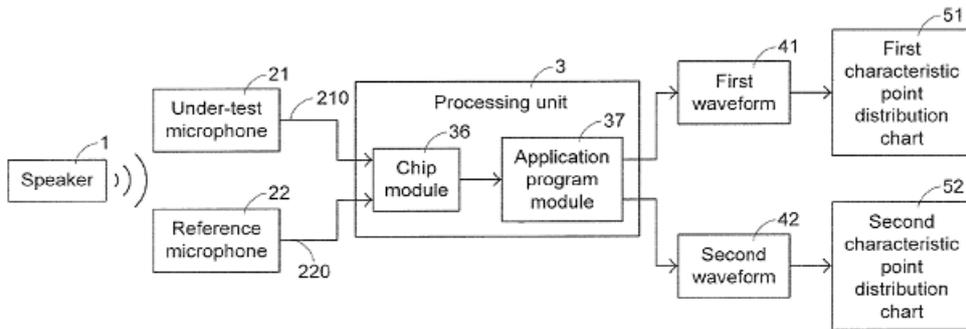
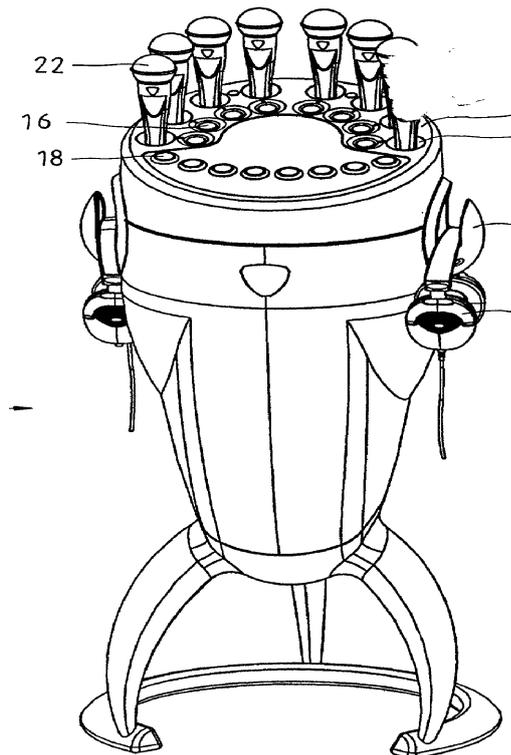


FIG.1

Example for testing arrangement to test a plurality of microphones:



References

Limiting references

This place does not cover:

| | |
|---|-----------------------------|
| Testing or monitoring arrangements for public address systems | H04R 29/007 |
|---|-----------------------------|

H04R 29/005

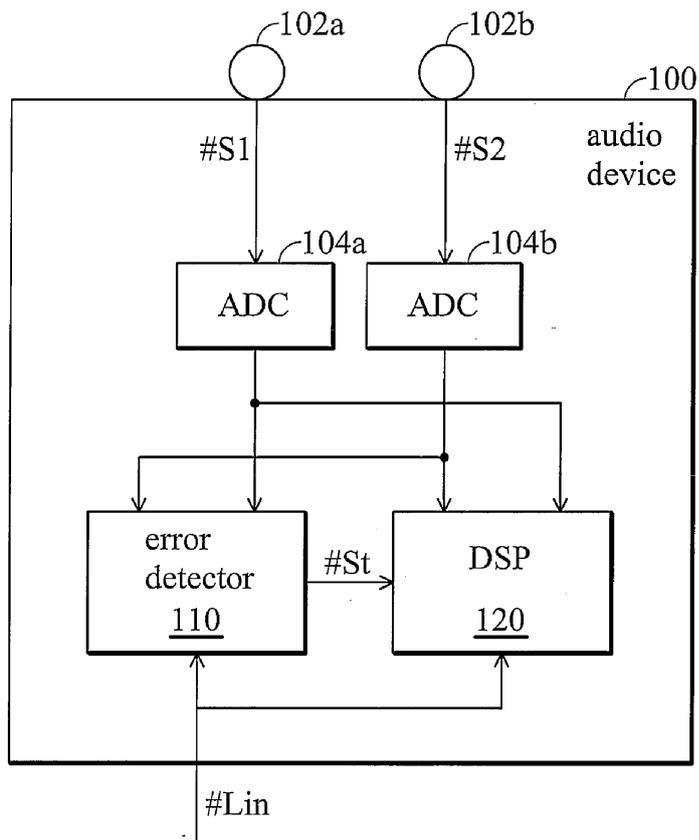
{Microphone arrays}

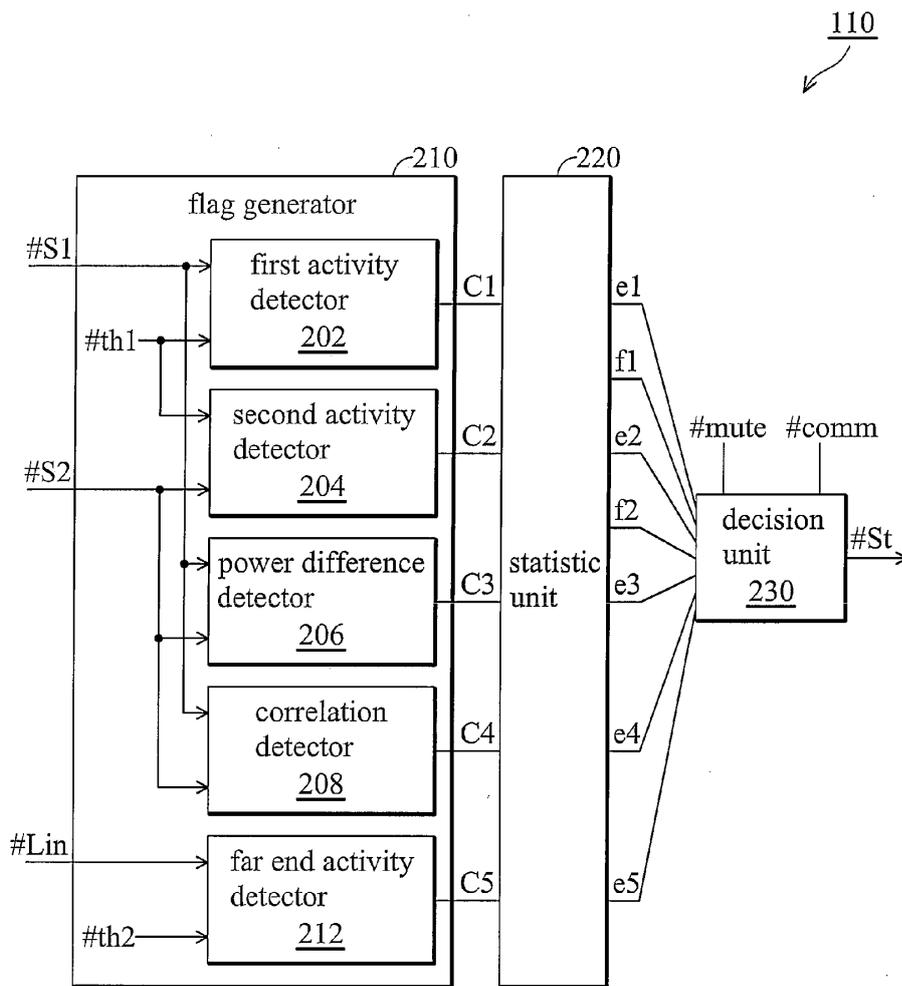
Definition statement

This place covers:

For example:

Functioning of the microphones (102a, 102b) is monitored (error detection 110) and if one microphone is considered defect, its signal is not used for further processing.





H04R 29/006

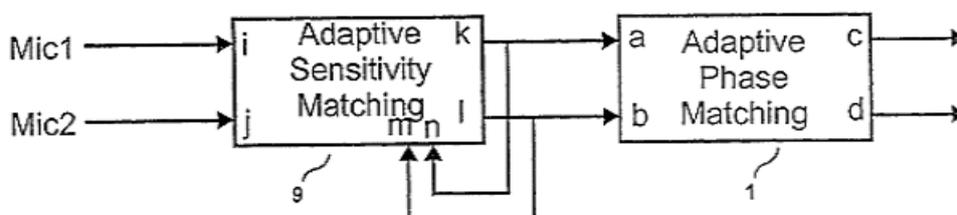
{Microphone matching}

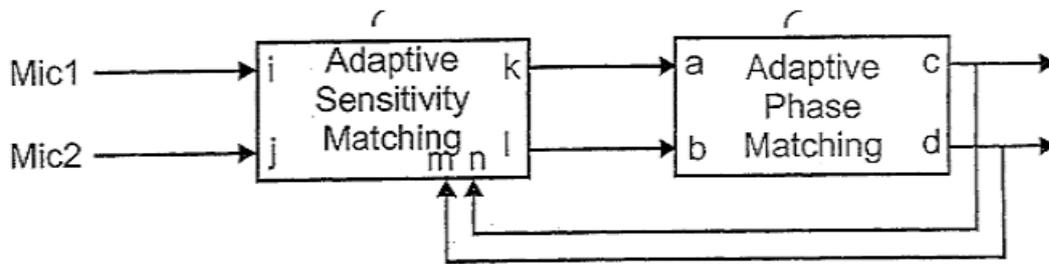
Definition statement

This place covers:

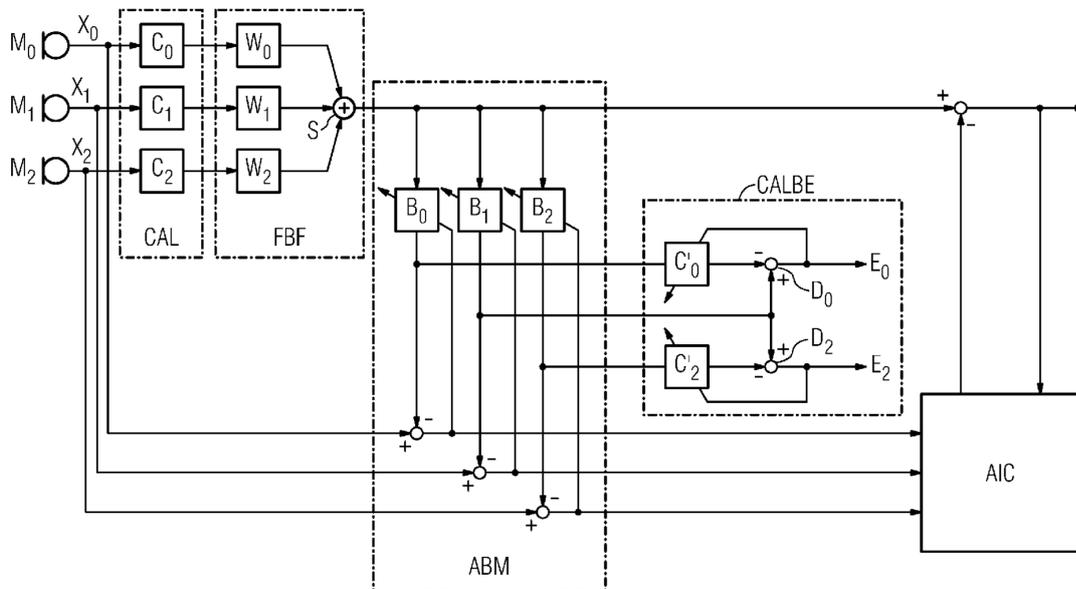
For example: US6272229.

For example: microphone matching in a microphone array in general





For example: microphone matching (CABLE) in an adaptive interference canceller (side-lobe canceller):



H04R 29/007

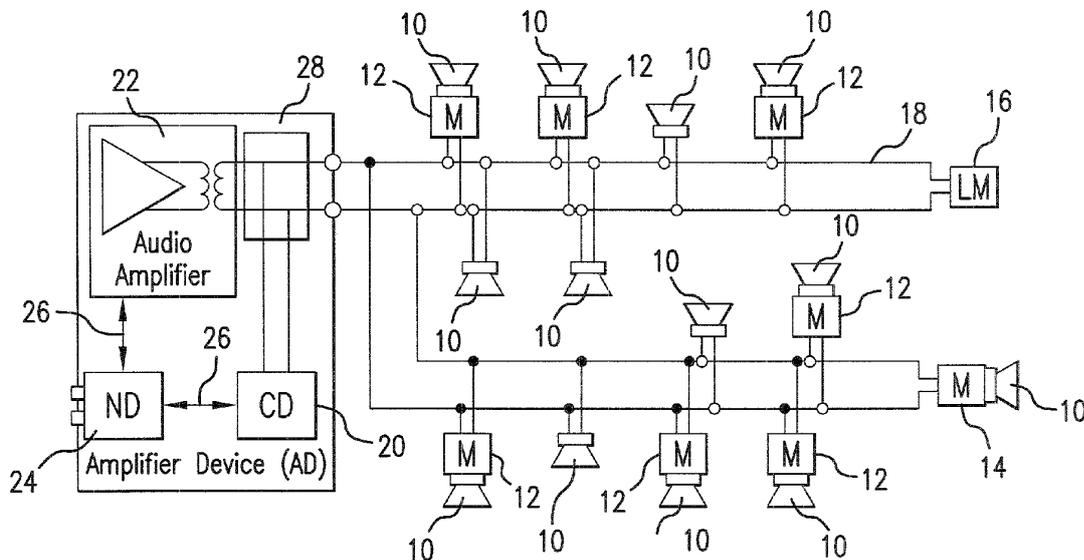
{for public address systems (public address systems per se [H04R 27/00](#))}

Definition statement

This place covers:

For example:

In the PA system shown in the figure control device (CD) polls all monitoring devices 12,14 and line monitoring devices 16 to check if errors have occurred: Monitoring 12 checks for example whether the voice coil in the loudspeaker is an open connection (e.g. loudspeaker is defect)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Public address systems per se | H04R 27/00 |
| Testing and monitoring for signalling and alarm systems | G08B 29/00 |

H04R 29/008

{Visual indication of individual signal levels (visual indication of stereophonic sound image [H04S 7/40](#))}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Indicating measured values | G01D 7/00 |
| Arrangements for displaying electric variables or waveforms | G01R 13/00 |
| Visual indication of stereophonic sound image | H04S 7/40 |

H04R 31/00

Apparatus or processes specially adapted for the manufacture of transducers or diaphragms therefor {(manufacture of microstructural arrangements of deformable or non-deformable structures in general [B81C 1/00182](#))}

Definition statement

This place covers:

Apparatus or processes specially adapted for the manufacture of

- acoustic transducers, including MEMS acoustic transducers
- diaphragms therefor;
- means for securing diaphragm or cone resiliently to support by flexible material, springs, cords, or strands for diaphragms.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--------------------------------|
| Microphones and microspeakers | B81B 2201/0257 |
| Manufacture of microstructural arrangements of deformable or non-deformable structures in general | B81C 1/00182 |
| Packaging of Smart-MEMS, i.e. packaging together processing unit and MEMS | B81C 1/0023 |
| Interconnecting the MEMS and the processing unit | B81C 1/00238 |
| Processes for packaging MEMS | B81C 1/00261 |
| Pressure measurement / constructional details associated with semiconductive diaphragm sensors, e.g. etching of diaphragms | G01L 9/0042 |

Special rules of classification

Further detail is covered by Indexing Code groups [H04R 2201/003](#), [H04R 2231/001](#) and [H04R 2231/003](#). Classification is obligatory.

H04R 31/003

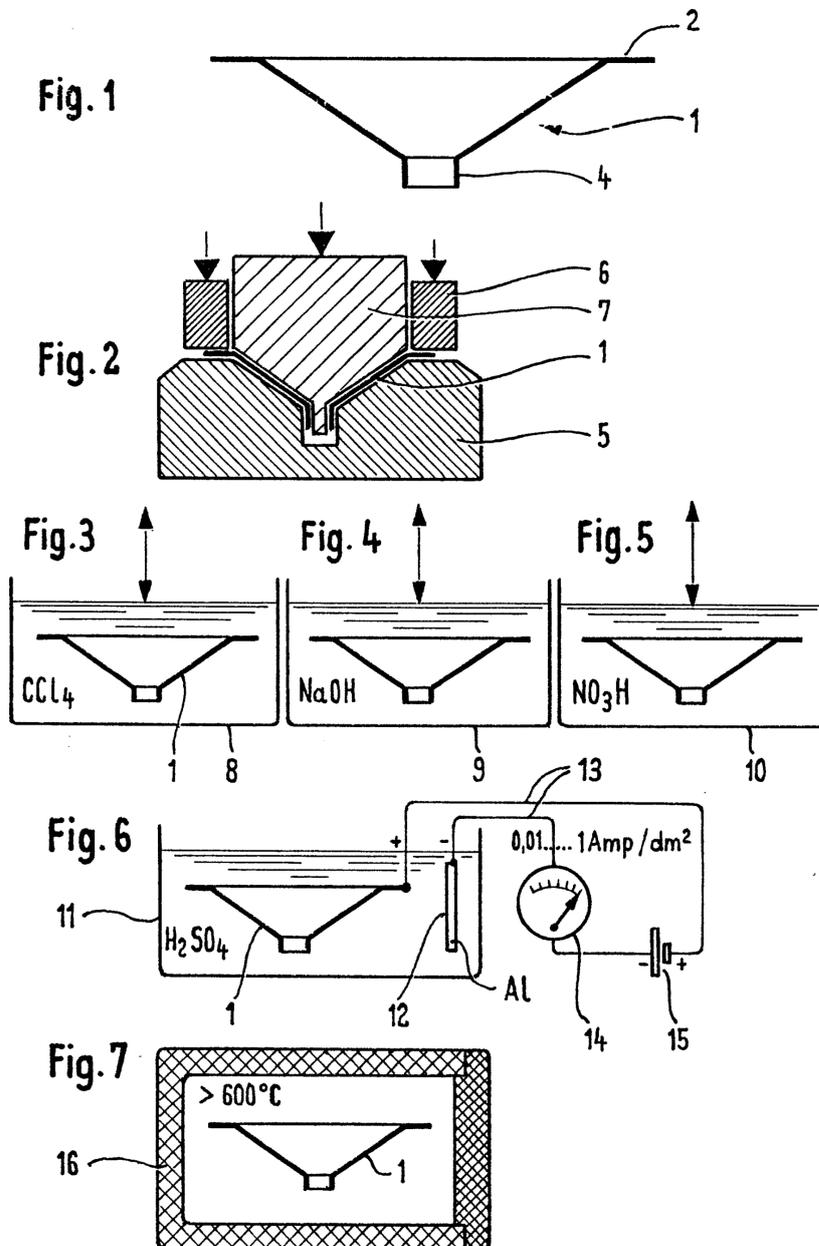
{for diaphragms or their outer suspension}

Definition statement

This place covers:

For example: Aluminium diaphragm (1) is pressed (5-7) out of an aluminium plate. The diaphragm is chemically treated cleaned (8-10) and the resulting diaphragm is treated with anodic oxidation to

form an amorphous ceramic diaphragm of Al_2O_3 . The amorphous diaphragm is heat treated to create corundum, a crystalline form of Al_2O_3 .



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Diaphragms for electromechanical transducers characterised by the construction | H04R 7/02 |
| Securing diaphragm or cone resiliently to support by flexible material, springs, cords, or strands | H04R 7/16 |
| Moulding of plastics | B29C 43/00 , B29C 45/00 , B29C 48/00 , B29C 49/00 |
| Shaping of plastics in general | B29C 67/00 |

| | |
|---|--|
| Manufacture of micromechanical membranes and diaphragms | B81C 1/00158 |
| Electroplating | C25D 3/00 , C25D 5/00 , C25D 7/00 , C25D 9/00 |
| Anodizing of metals | C25D 11/00 |

Special rules of classification

Further detail is covered by Indexing Code group [H04R 2207/021](#) and the subgroups of [H04R 2307/00](#). Classification is obligatory.

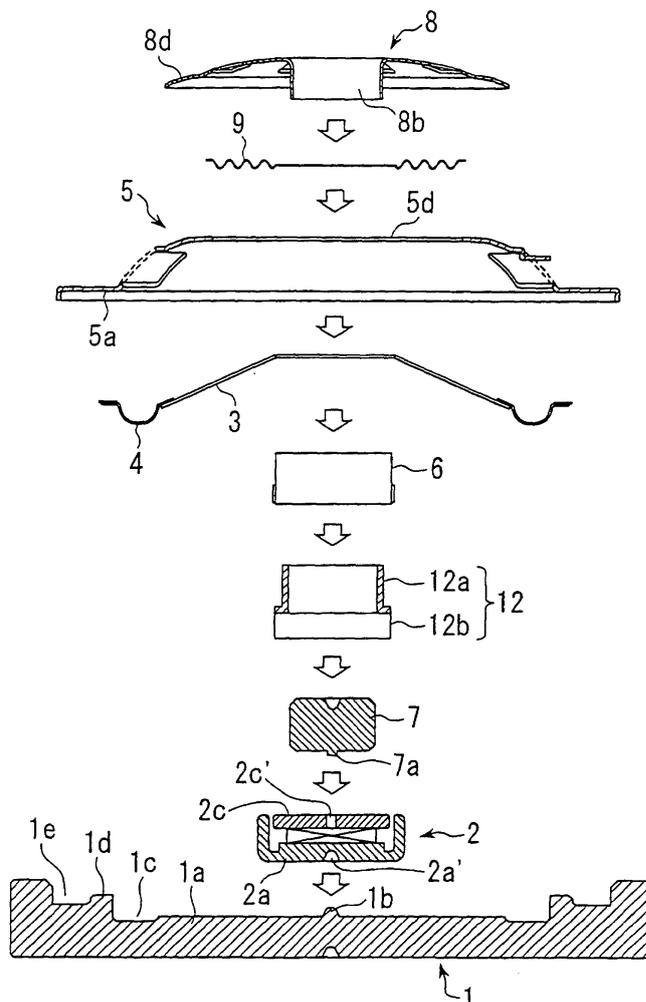
H04R 31/006

{Interconnection of transducer parts (of diaphragm and outer suspension by moulding [H04R 31/003](#))}

Definition statement

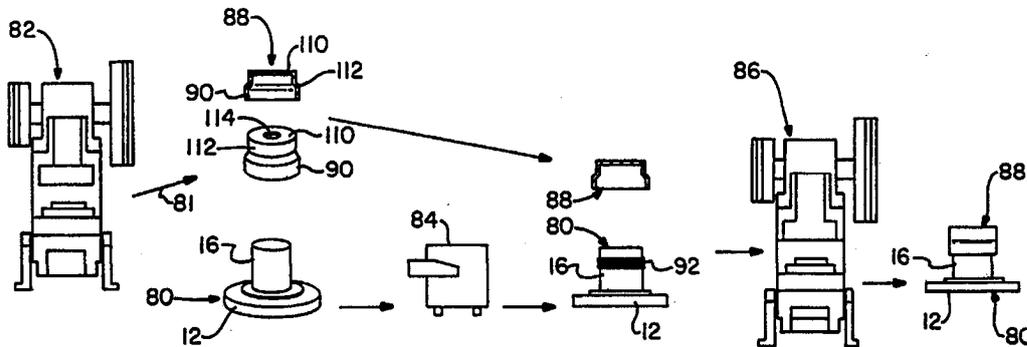
This place covers:

For example: A transducer is assembled with the help of jig 1 and jig 12 used for relative positioning of the parts during assembly. Jig 12 is removed before mounting of bottom frame 8. Jig 1 is removed after complete assembly.



Definition statement

For example: A centre pole cap 88 is formed with cap die press 82. With help of pattern roller 82 an axial gripping surface 92 is formed on the centre pole 16, after which the cap is pressed on the pole with press 86. The cap is held in place by interference fit.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| Assembly of magnetic circuit for electrodynamic transducers | H04R 2209/024 |
| Adhesives | C09J |

H04R 2201/003

Mems transducers or their use (of the electrostatic type [H04R 19/005](#))

References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Mems transducers of the electrostatic type | H04R 19/005 |
|--|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--------------------------------|
| Arrangements for avoiding sticking of the flexible or moving parts of MEMS devices having such parts | B81B 3/0002 |
| MEMS packages and encapsulations | B81B 7/0032 |
| Microphones and microspeakers | B81B 2201/0257 |
| MEMS structures allowing for movement | B81B 2203/01 |
| Type of movement | B81B 2203/05 |

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------|-------------------------------|
| MEMS | Microelectromechanical system |
|------|-------------------------------|

H04R 2201/021

Transducers or their casings adapted for mounting in or to a wall or ceiling

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| Sound or noise insulation, absorption, or reflection | E04B 1/82 |
| Sound or noise insulation, absorption, or reflection of floors or ceilings | E04B 9/001 |
| Sound or noise insulation, absorption, or reflection of flooring | E04F 15/20 |
| Room acoustics, i.e. forms of, or arrangements in, rooms for influencing or directing sound | G10K 11/175 |

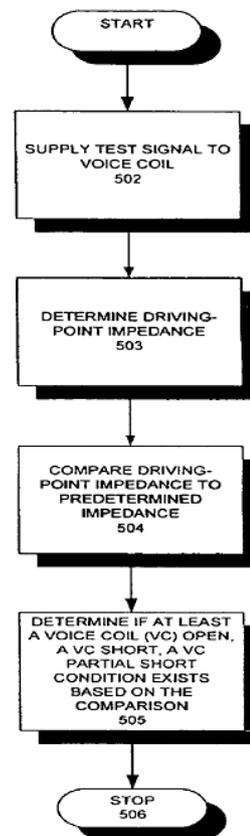
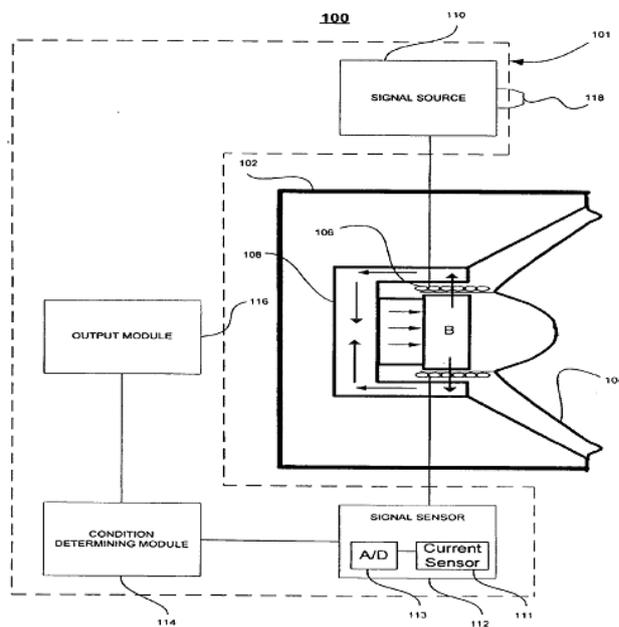
H04R 2201/023

Transducers incorporated in garment, rucksacks or the like

Definition statement

This place covers:

For example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Garments adapted to accommodate electronic equipment | A41D 1/002 |
| Footwear with sound or music sources | A43B 3/50 |

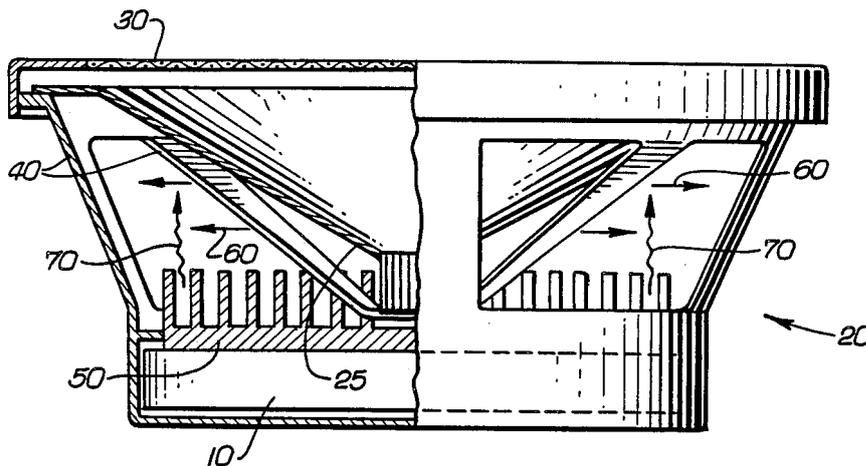
H04R 2201/028

Structural combinations of loudspeakers with built-in power amplifiers, e.g. in the same acoustic enclosure ([H04R 2499/10](#) takes precedence; Single (sub)woofer with two or more satellite loudspeakers for mid- and high-frequency band reproduction driven via the (sub)woofer [H04R 2205/026](#))

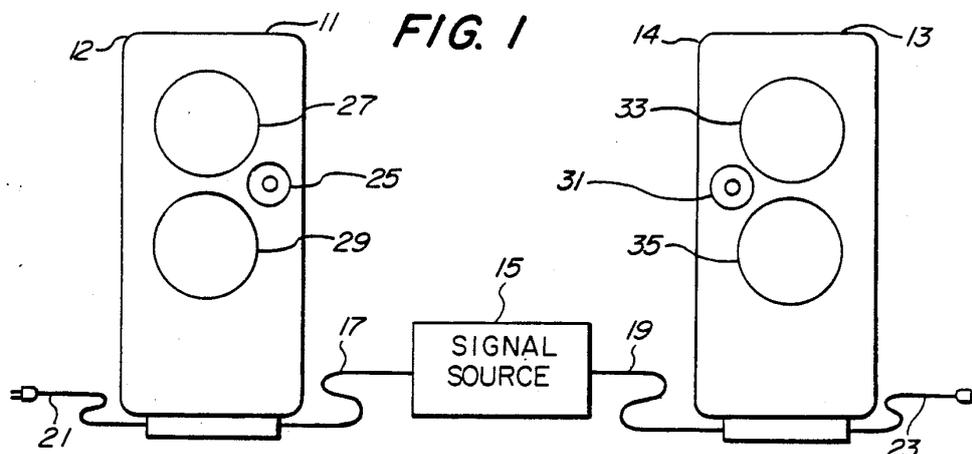
Definition statement

This place covers:

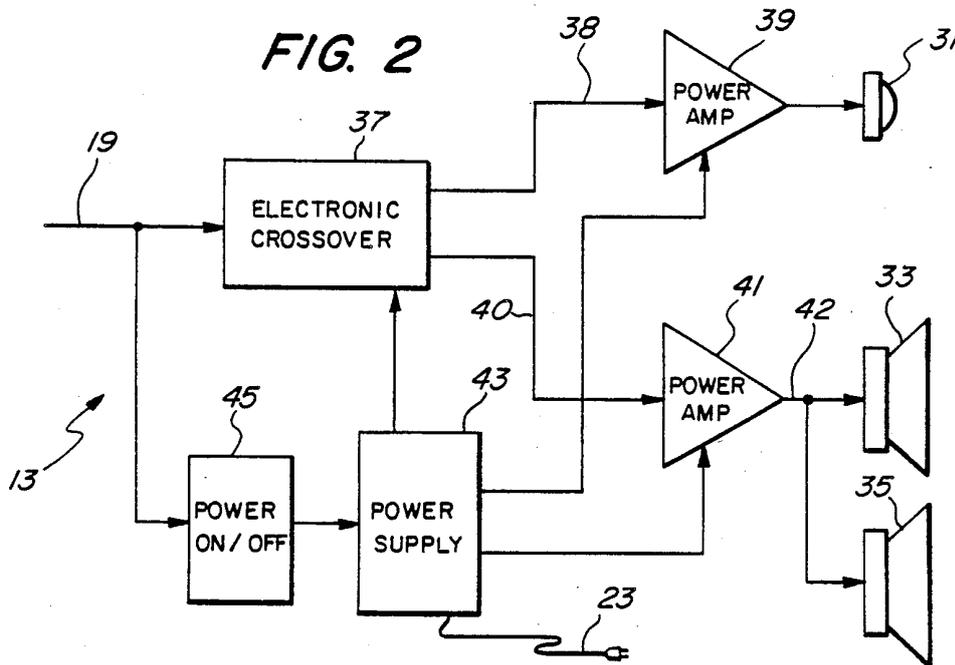
For example: (amplifier (10) mounted to transducer (20))



(amplifier mounted to loudspeaker enclosure)



For example: (the active loudspeaker (311,312) is placed in a separate enclosure (11,12) used in a television)



References

Limiting references

This place does not cover:

| | |
|----------------------|------------------------------|
| General applications | H04R 2499/10 |
|----------------------|------------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| Single (sub)woofer with two or more satellite loudspeakers for mid- and high-frequency band reproduction driven via the (sub)woofer | H04R 2205/026 |
|---|-------------------------------|

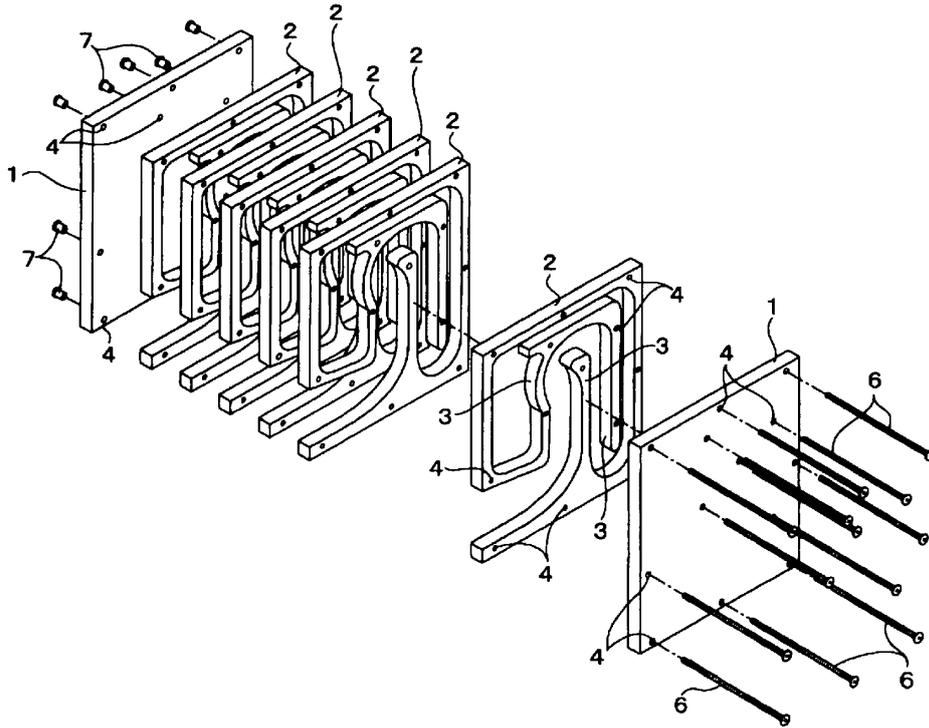
H04R 2201/029

Manufacturing aspects of enclosures transducers

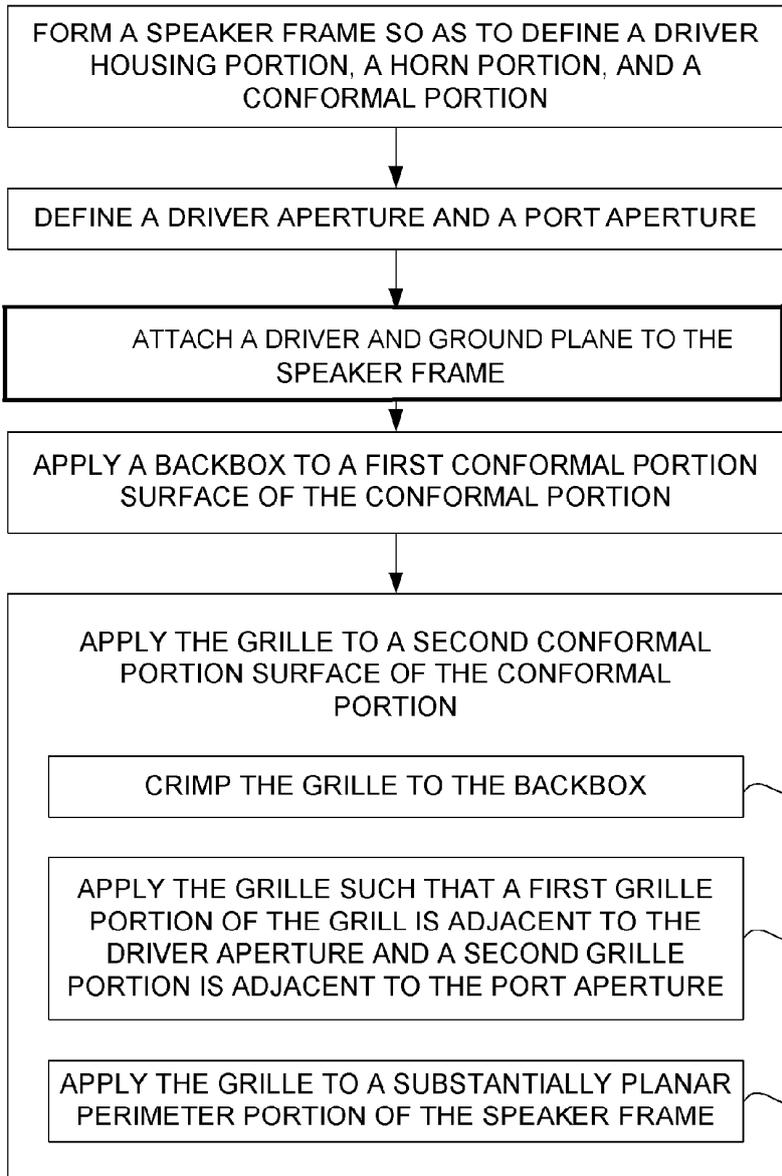
Definition statement

This place covers:

For example: manufacture of loudspeaker casing with backloaded horn using two lateral plates (1) and a plurality of intermediate plates (2) which are screwed together (6,7).



For example: assembly of loudspeaker.



H04R 2201/105

Manufacture of mono- or stereophonic headphone components

Definition statement

This place covers:

Typical components are earpiece supports, ear tips, and ear cushions, transducers specially adapted for earphones or headphones.

References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Manufacture of diaphragms for acoustic transducers | H04R 31/003 |
|--|-----------------------------|

Informative references

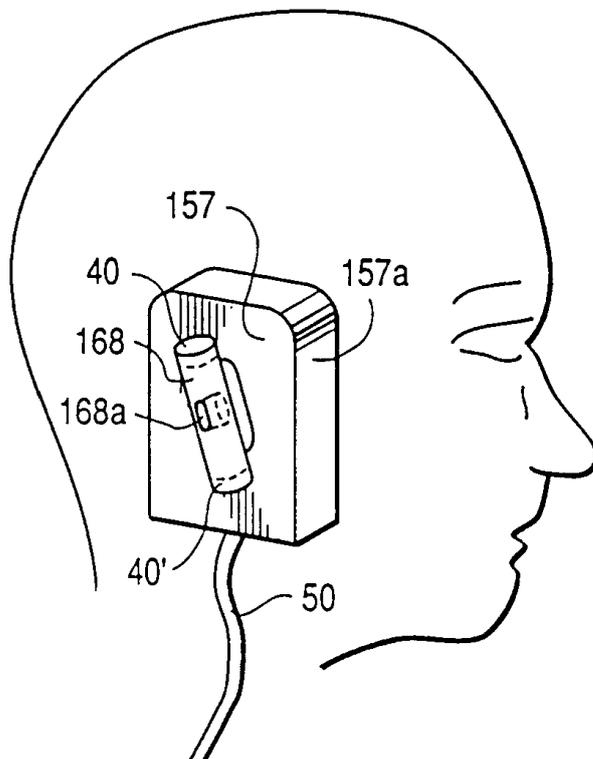
Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-------------------------------|
| Manufacture or assembly of earphones or headphones | H04R 1/1058 |
| Manufacturing aspects of the magnetic circuit of loudspeaker or microphone transducers | H04R 2209/024 |

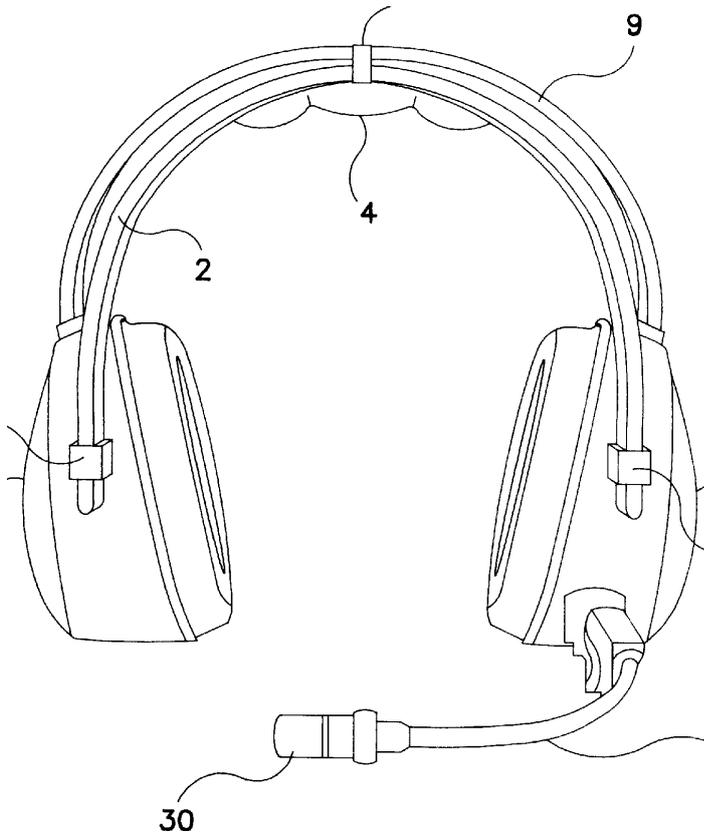
H04R 2201/107**Monophonic and stereophonic headphones with microphone for two-way hands free communication****Definition statement**

This place covers:

For example: (monophonic: microphone (40)).



For example: (stereophonic; microphone (30)).



H04R 2201/109

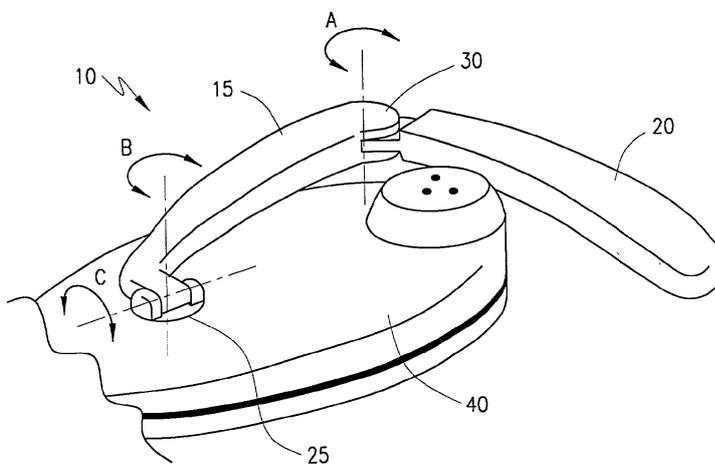
Arrangements to adapt hands free headphones for use on both ears

Definition statement

This place covers:

First illustrative example of the subject matter classified in [H04R 2201/109](#):

- Monophonic: rotatable joint 25 enables rotation about axes B and C.



Second illustrative example of subject matter classified in [H04R 2201/109](#):

H04R 2201/34

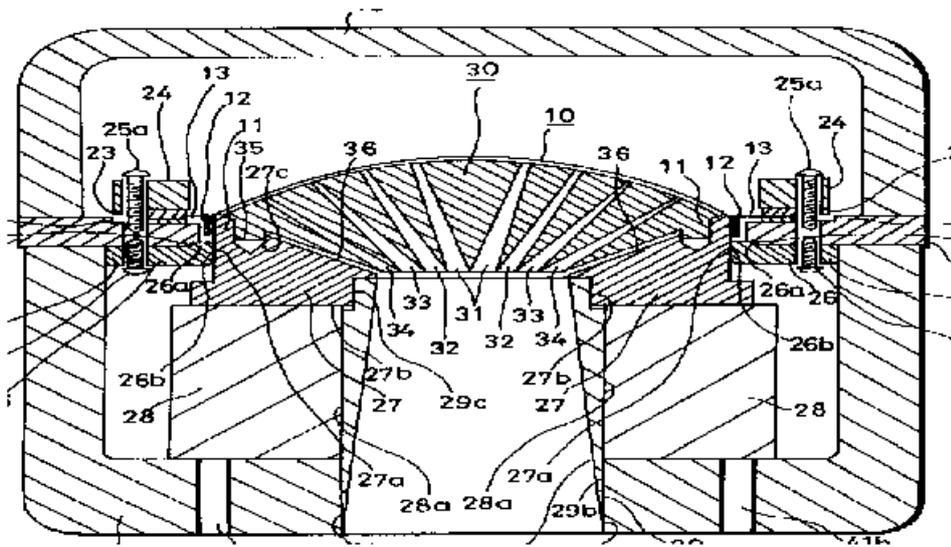
Directing or guiding sound by means of a phase plug

Definition statement

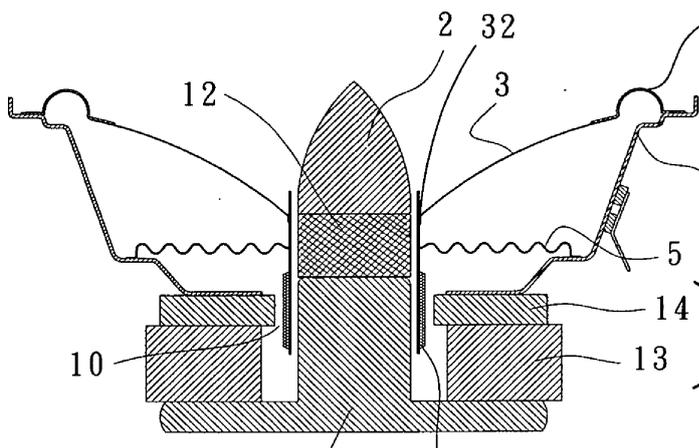
This place covers:

For example: US5933508 (phase plug of a compression driver), US2006153412 (phase plug used with a transducer).

For example: (phase plug (30) of a compression driver)



For example: (phase plug used with a transducer)



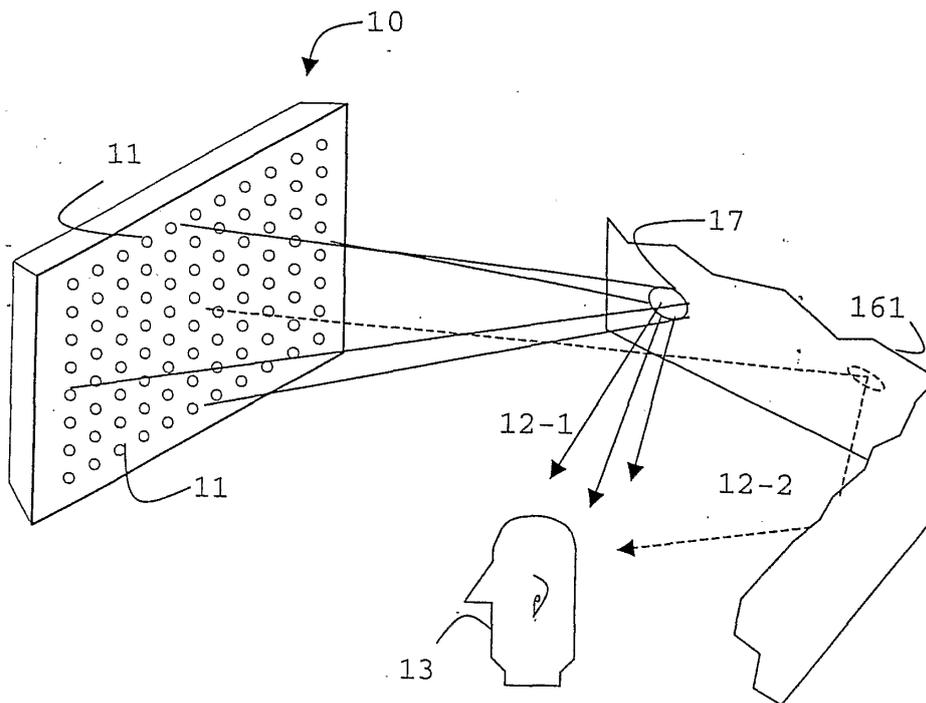
H04R 2203/12

Beamforming aspects for stereophonic sound reproduction with loudspeaker arrays

Definition statement

This place covers:

See for example: generation of multiple sound channels (12-1, 12-2) to reproduce stereophonic sound



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Beamforming aspects for sound reproduction in general | H04R 2430/20 |
|---|------------------------------|

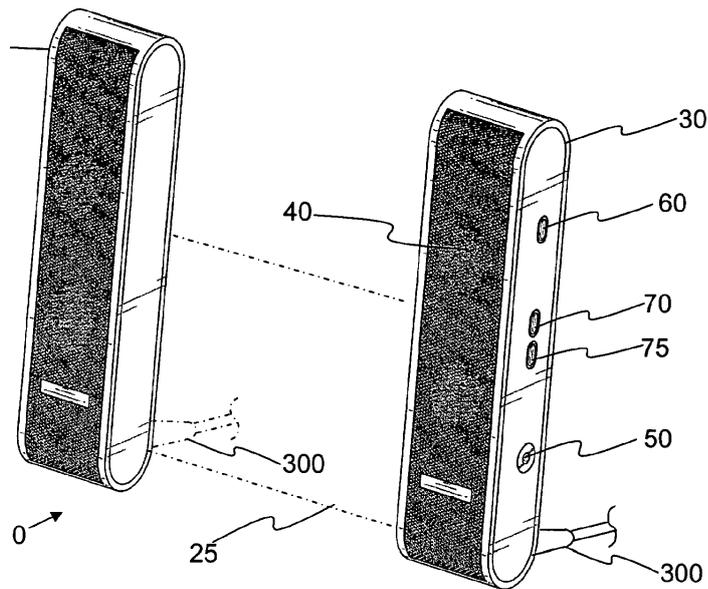
H04R 2205/021

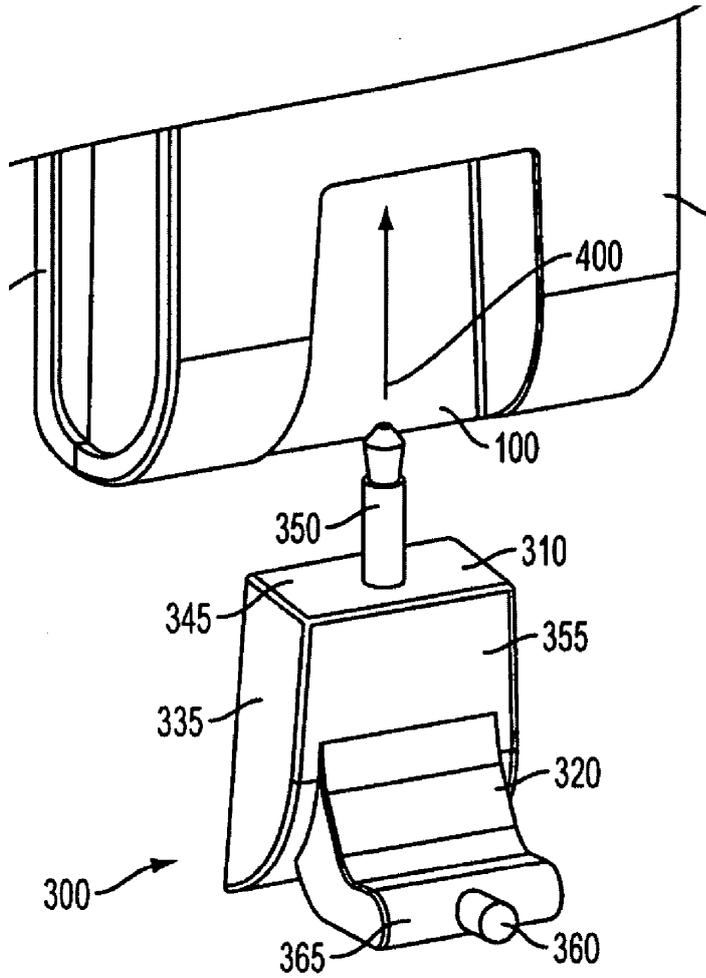
Aspects relating to docking-station type assemblies to obtain an acoustical effect, e.g. the type of connection to external loudspeakers or housings, frequency improvement

Definition statement

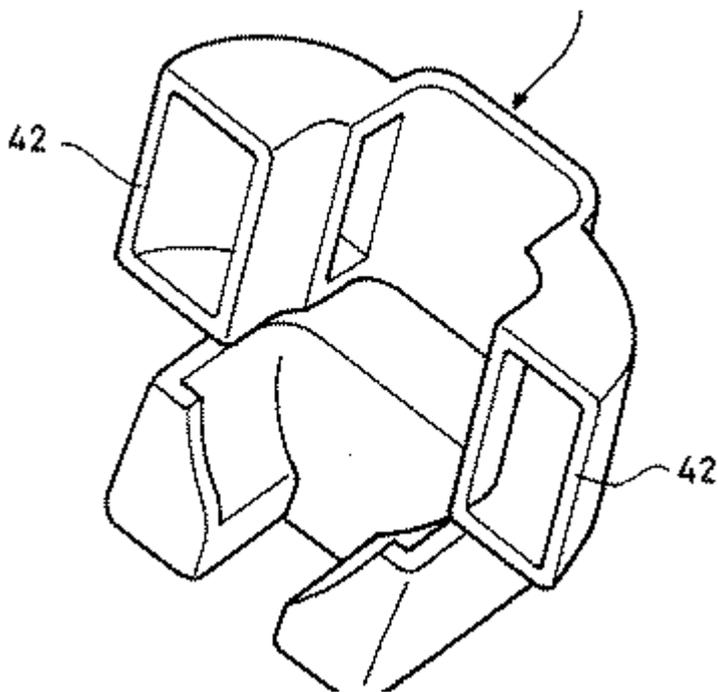
This place covers:

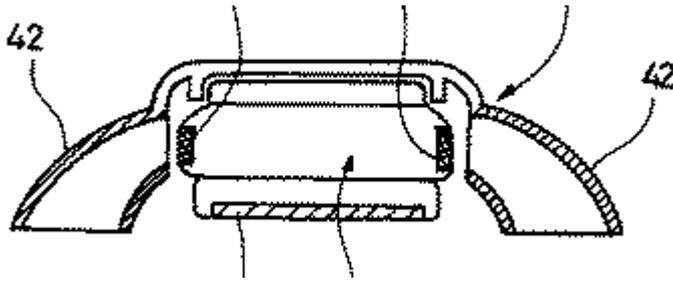
For example: (electric connection)





JP2005136895 (acoustic connection)





References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| External expansion units, e.g. docking stations | G06F 1/1632 |
| Cabinets for information storage devices; Cases; Stands; Disposition of apparatus therein or thereon | G11B 33/02 |
| Disposition of constructional parts in the apparatus for information storage devices, e.g. of power supply, of modules | G11B 33/12 |
| Side-by-side or stacked arrangements for casings, cabinets or drawers for electric apparatus | H05K 5/0021 |

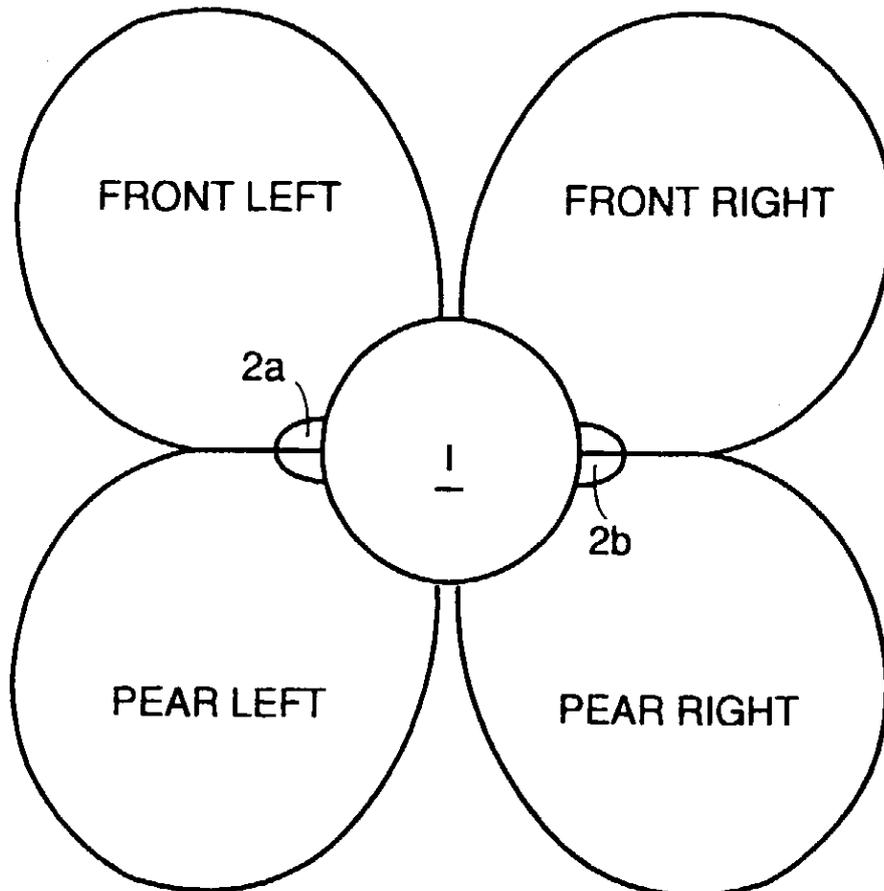
H04R 2205/022

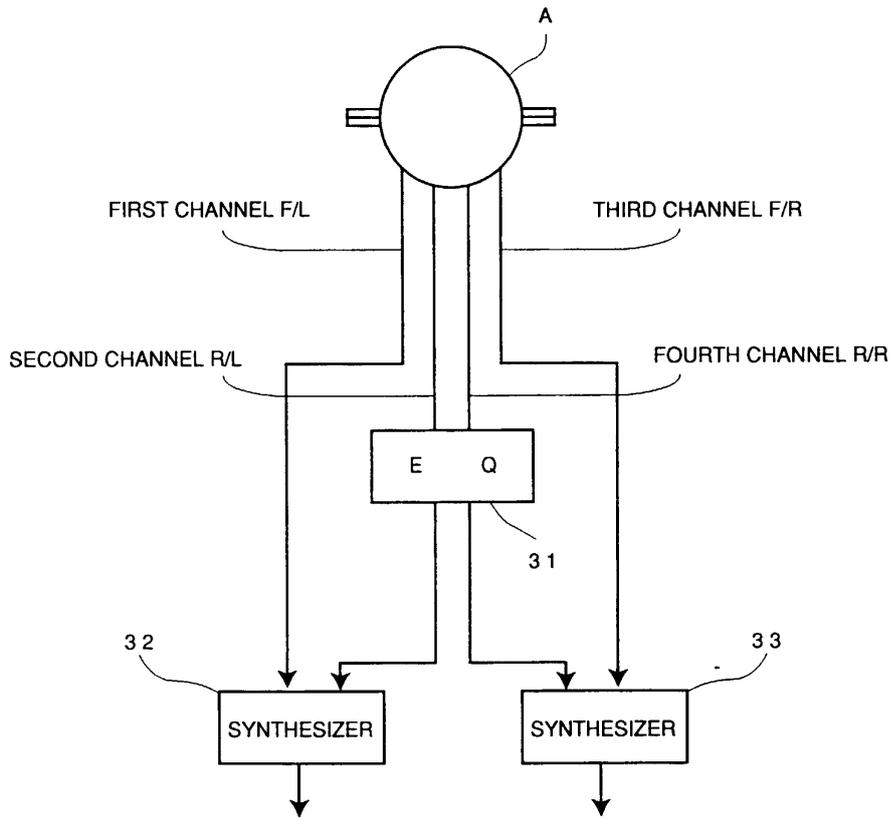
Plurality of transducers corresponding to a plurality of sound channels in each earpiece of headphones or in a single enclosure

Definition statement

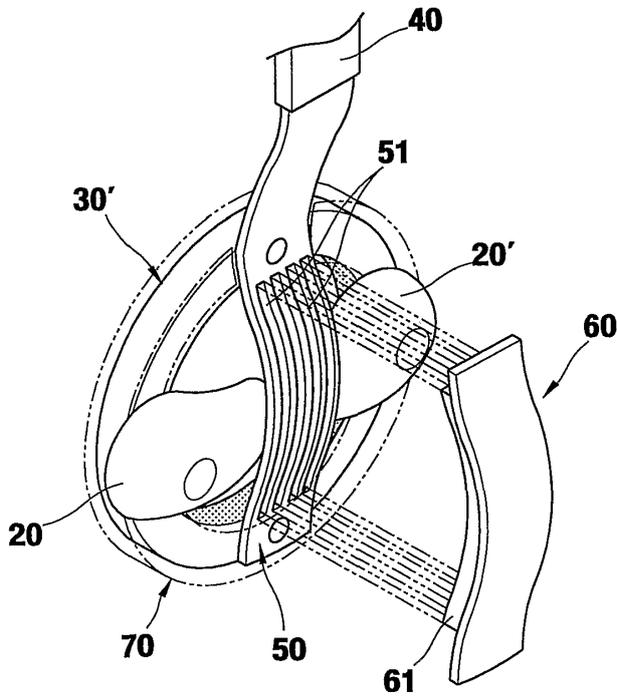
This place covers:

For example: (two-channel microphones in earpiece (2a, 2b) mounted on a spherical structure (1) for four-channel sound capture).

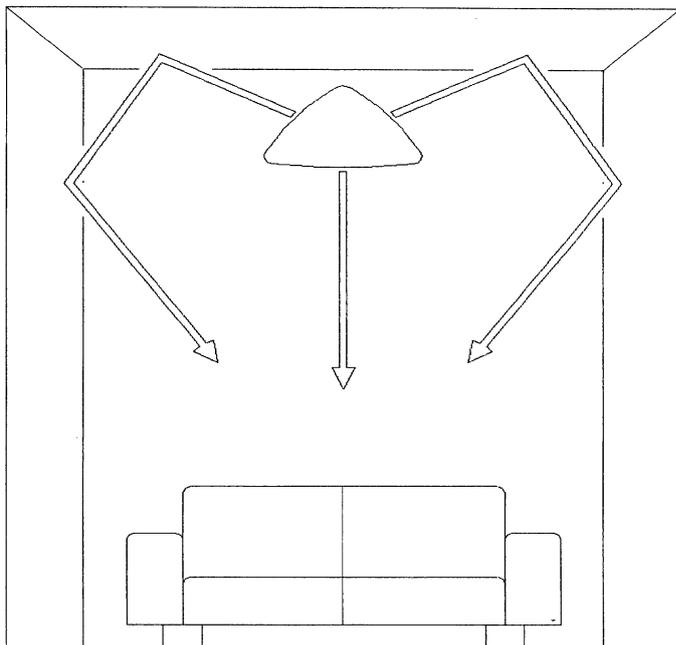




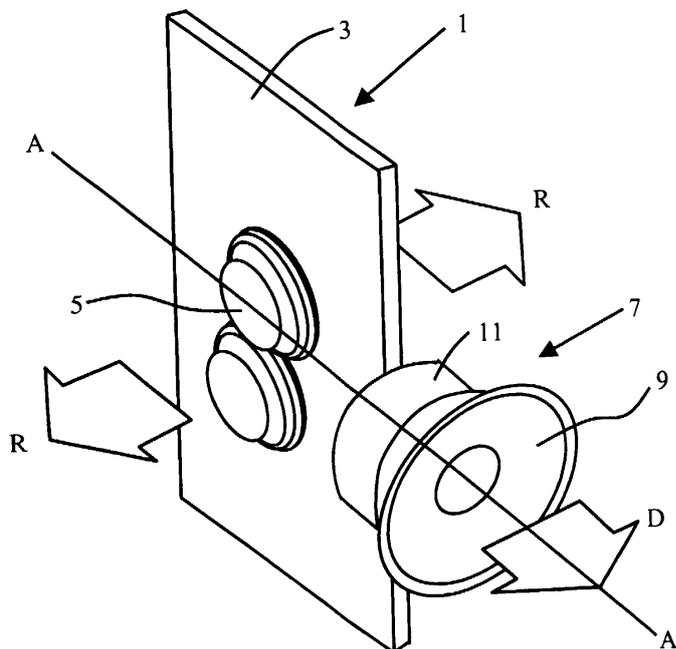
For example: (multiple channels (20, 20') in earpiece (30) of headphones).



For example: (multiple channels in single loudspeaker box).



For example: (multiple channels in single loudspeaker box, comprising a pistonic loudspeaker transducer (7) and a distributed mode panel (3) with exciters (5)).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Positioning of loudspeaker enclosures for spatial sound reproduction | H04R 5/02 , H04R 2205/024 |
|--|--|

| | |
|---|----------------------------|
| Positioning of microphones for spatial sound recording in general | H04R 5/027 |
|---|----------------------------|

H04R 2205/024

Positioning of loudspeaker enclosures for spatial sound reproduction

Definition statement

This place covers:

Aspect relating to the relative positioning of loudspeaker enclosures, e.g. determination of their actual position

References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| Mounting of transducers in earphones or headphones | H04R 1/1075 |
| Public address systems | H04R 27/00 |
| Electronic adaptation of stereophonic sound system to listener position or orientation | H04S 7/302 |

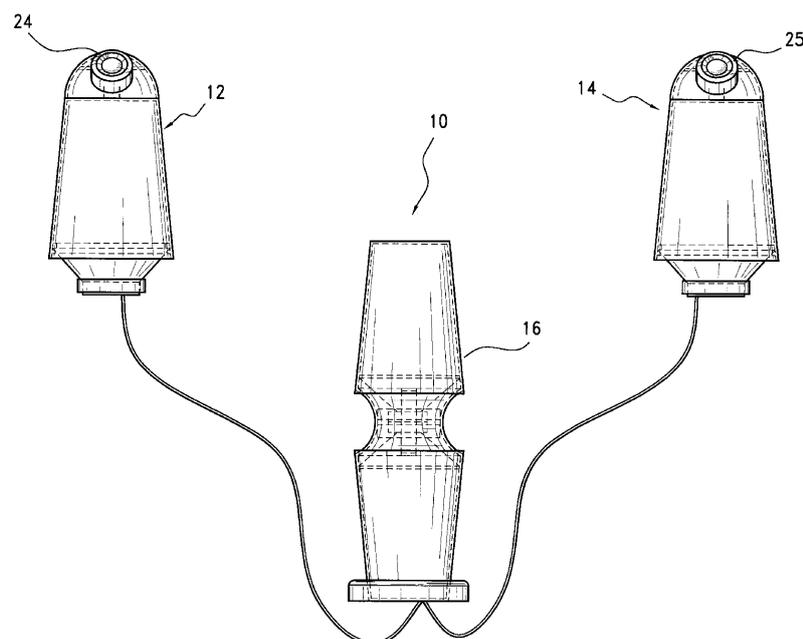
H04R 2205/026

Single (sub)woofer with two or more satellite loudspeakers for mid- and high-frequency band reproduction driven via the (sub)woofer

Definition statement

This place covers:

For example:



H04R 2205/041**Adaptation of stereophonic signal reproduction for the hearing impaired****References****Limiting references***This place does not cover:*

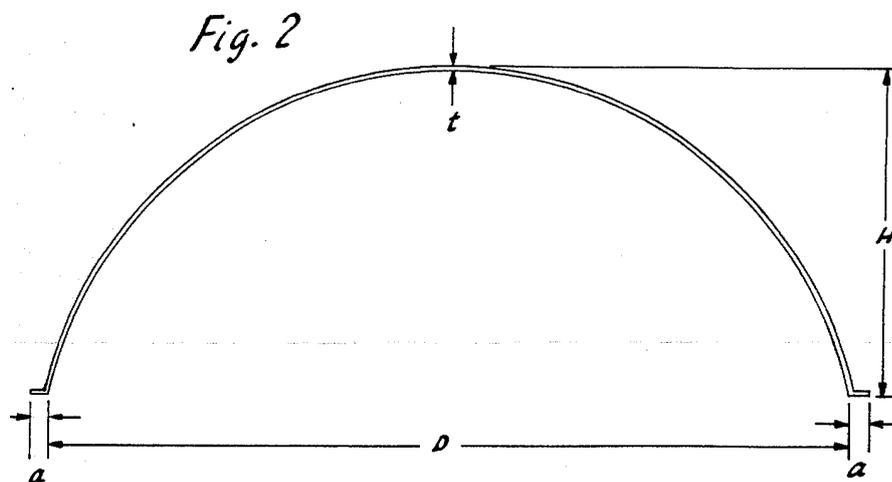
| | |
|---------------|----------------------------|
| Deaf-aid sets | H04R 25/00 |
|---------------|----------------------------|

Informative references*Attention is drawn to the following places, which may be of interest for search:*

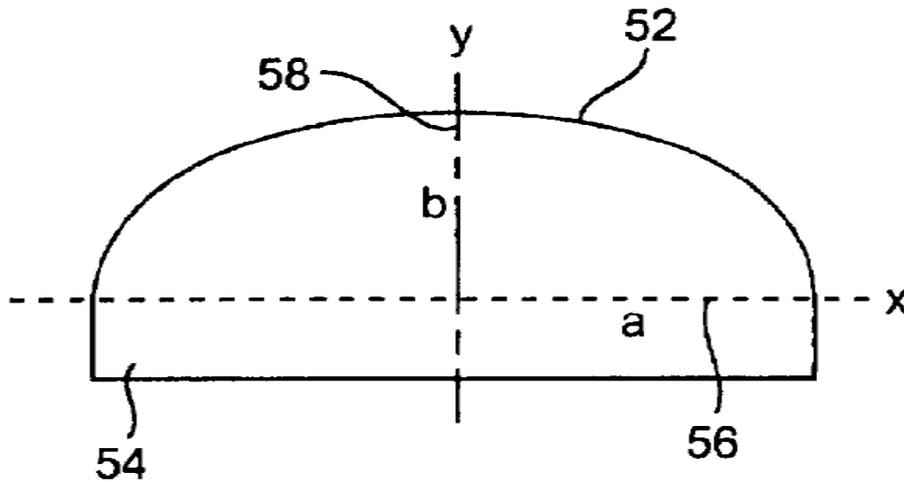
| | |
|--|------------------------------|
| Telephone sets for the hearing impaired | H04M 1/2475 |
| Mobile telephones for the hearing impaired | H04M 1/72478 |

H04R 2207/021**Diaphragm extensions, not necessarily integrally formed, e.g. skirts, rims, flanges****Definition statement***This place covers:*

For example: (flange (a) to prevent deformation of dome during firing to obtain a ceramic diaphragm



For example: (annular skirt (54) extending from the dome (52), around which a voice coil is wound)



H04R 2209/024

Manufacturing aspects of the magnetic circuit of loudspeaker or microphone transducers

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|--|
| Magnetic circuits for electrodynamic loudspeaker transducers | H04R 9/025 |
| Magnetic materials, cores, yokes and magnets in general, and their manufacture | H01F 1/00 , H01F 3/00 , H01F 7/00 |

H04R 2209/026

Transducers having separately controllable opposing diaphragms, e.g. for ring-tone and voice ([H04R 2400/03](#) takes precedence)

References

Limiting references

This place does not cover:

| | |
|---|------------------------------|
| Transducers capable of generating both sound as well as tactile vibration e.g. as used in cellular phones | H04R 2400/03 |
|---|------------------------------|

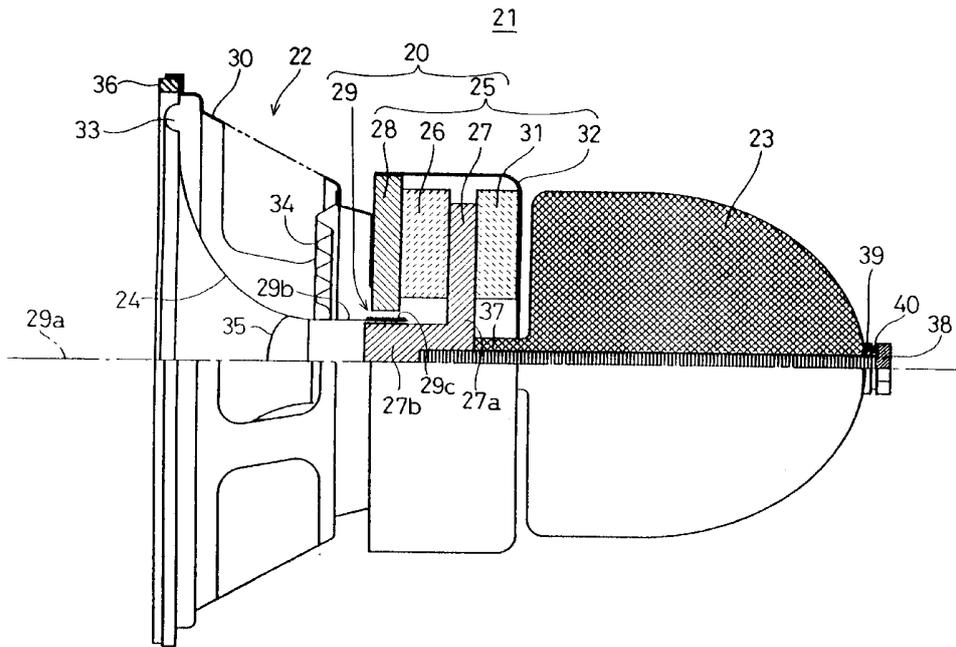
H04R 2209/027

Electrical or mechanical reduction of yoke vibration

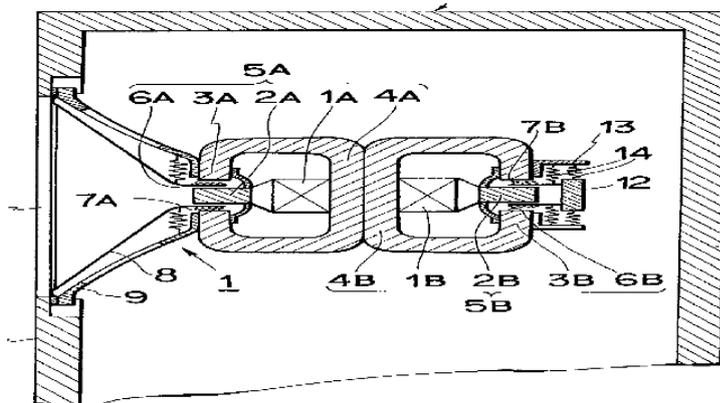
Definition statement

This place covers:

For example: (passive reduction with the help of a weight (23) mounted at the rear side of the magnetic circuit (25) of loudspeaker transducer (25)).



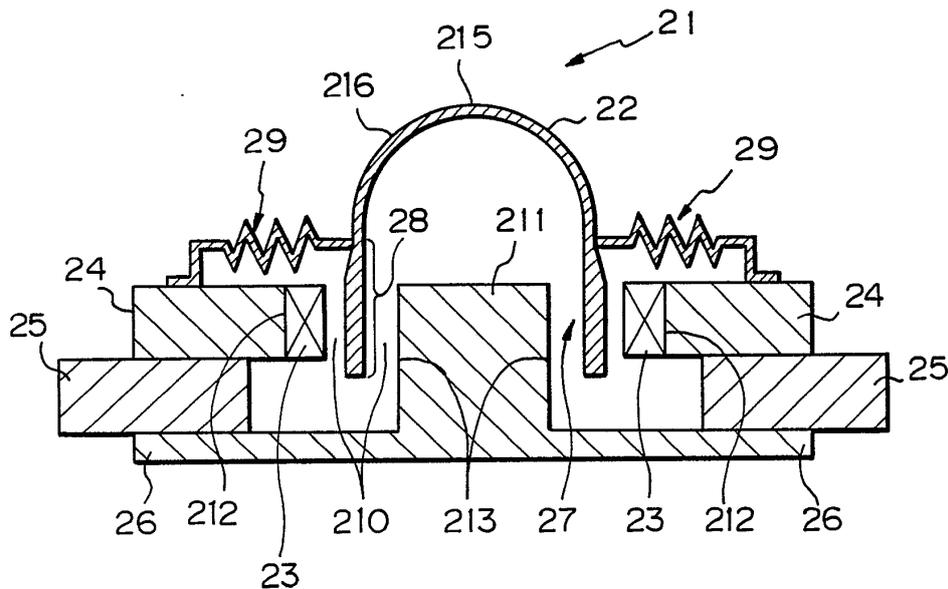
For example (active reduction with the help of a second magnetic circuit (5B)). This second magnetic circuit is similar to the first magnetic circuit (5A) driving the diaphragm (8) and attached thereto. Voice coil 7B is driven with part of the signal with which voice coil 7A is driven, such that a weight coupled to the coil 7B move in a direction opposite to that of the diaphragm (8)).



H04R 2209/043**Short circuited voice coils driven by induction****Definition statement**

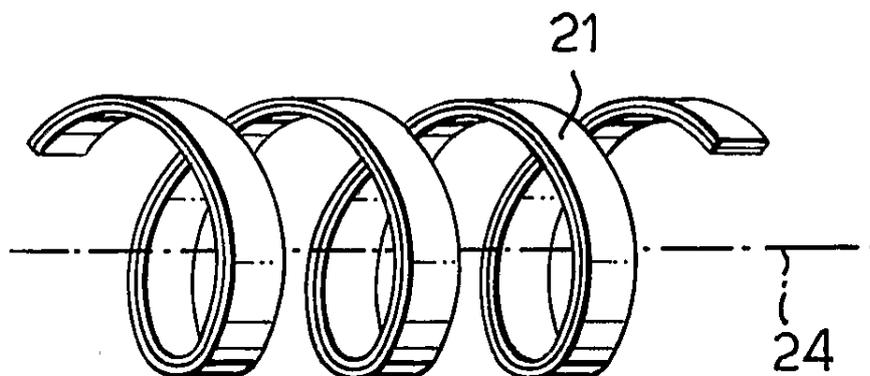
This place covers:

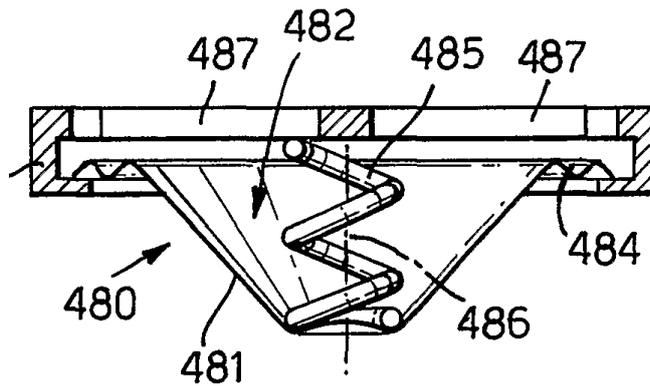
For example: (short circuited moving coil (28) and static driving coil (23))

**H04R 2217/01****Non-planar magnetostrictive, piezoelectric or electrostrictive benders****Definition statement**

This place covers:

For example: a flat bi-layer tape (21) extending around a minor axis (24) in a helix to form a helical electro-active structure extending along the minor axis (24). The tape can be used as shown in the right-hand figure to obtain a loudspeaker driver (480).





H04R 2217/03

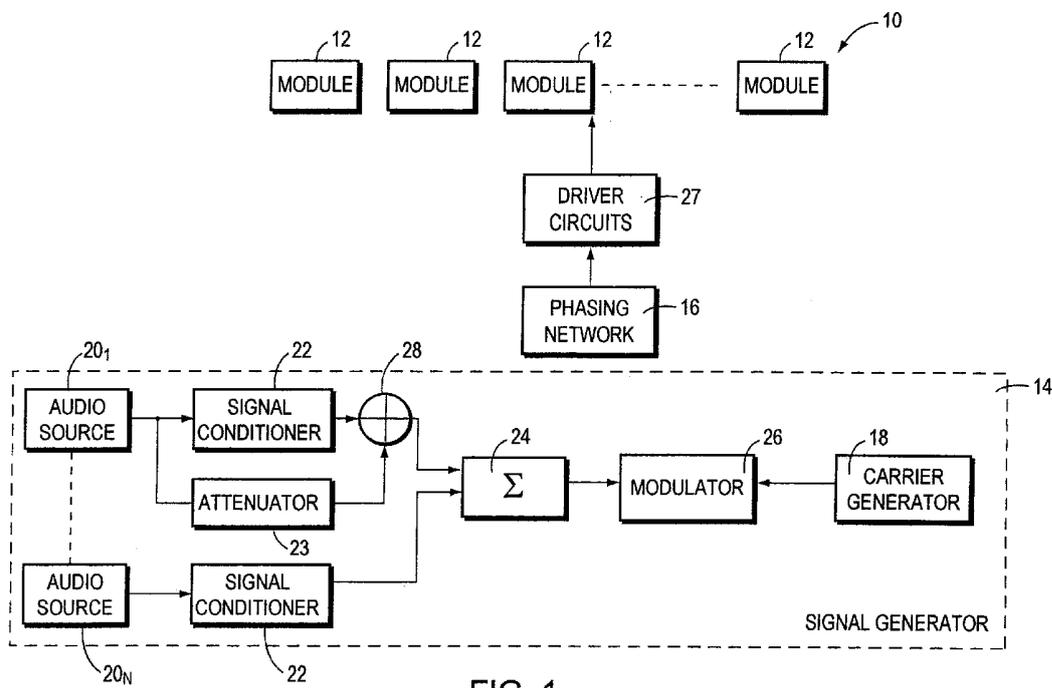
Parametric transducers where sound is generated or captured by the acoustic demodulation of amplitude modulated ultrasonic waves

Definition statement

This place covers:

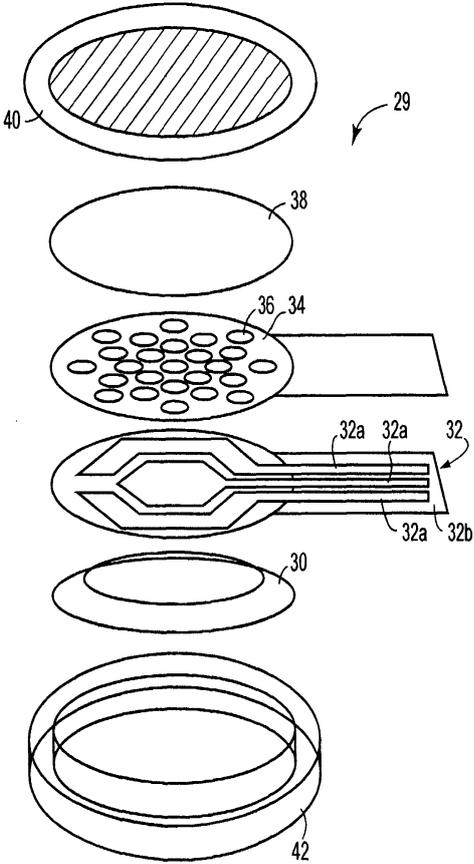
Construction or application of such transducers. Sound generation may be using piezoelectric, electrostatic, or other principles.

For example: schematic driving circuit (14, 6, 27) for a parametric loudspeaker array comprising a plurality of modules (12, 29).

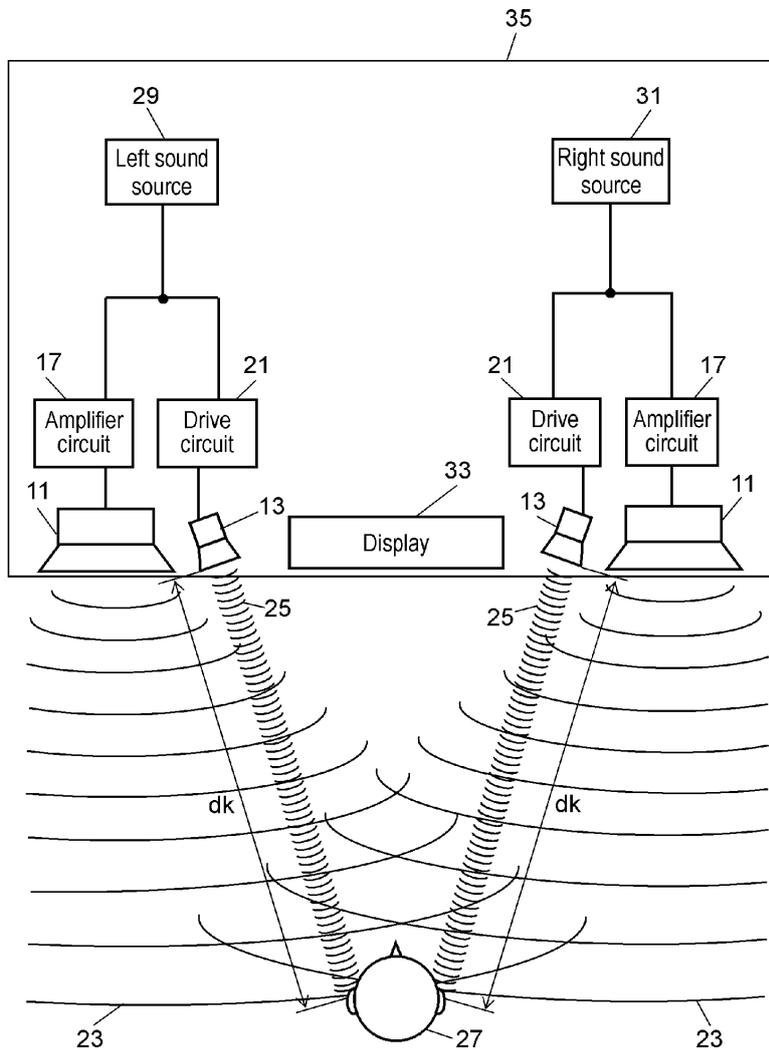


An example for the modules used with the driving circuit above is shown in the figure directly below. A conductive electrode unit (32), a dielectric spacer (34) provided with an array of apertures (36), and a metallized polymer membrane (38). The components (32-38) are compressed against the spring (30) by an upper ring (40) that bears against the film (38) and threadably engages a base member

(42) that supports the spring (30). The module (29) comprises a plurality of electrostatic transducers, corresponding with the respective apertures (36) in the polymer spacer (34).



For example: sound reproduction for a TV, one parametric loudspeaker and one conventional nonparametric loudspeaker per channel.



Synonyms and Keywords

In patent documents, the following words/expressions are often used with the meaning indicated:

| | |
|--------------------------|-------------------------------|
| "parametric loudspeaker" | "superdirective loudspeaker". |
|--------------------------|-------------------------------|

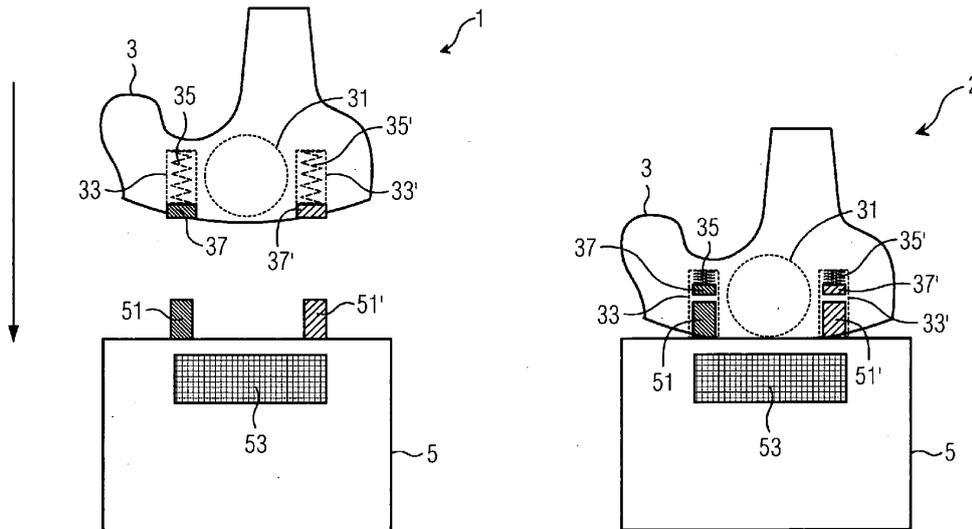
H04R 2225/31

Aspects of the use of accumulators in hearing aids, e.g. rechargeable batteries or fuel cells

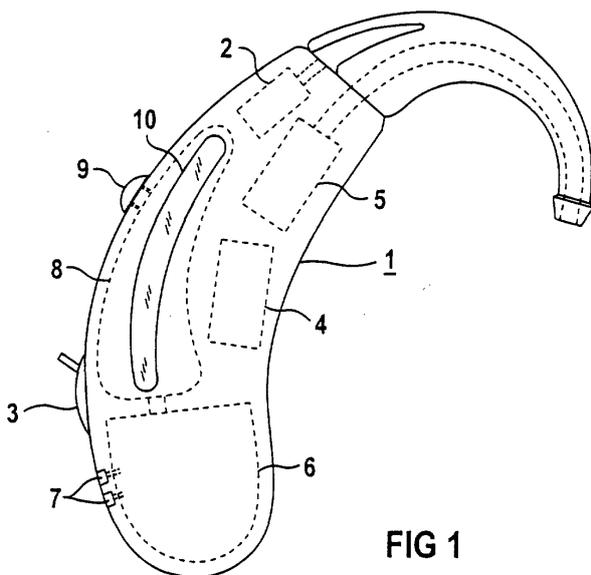
Definition statement

This place covers:

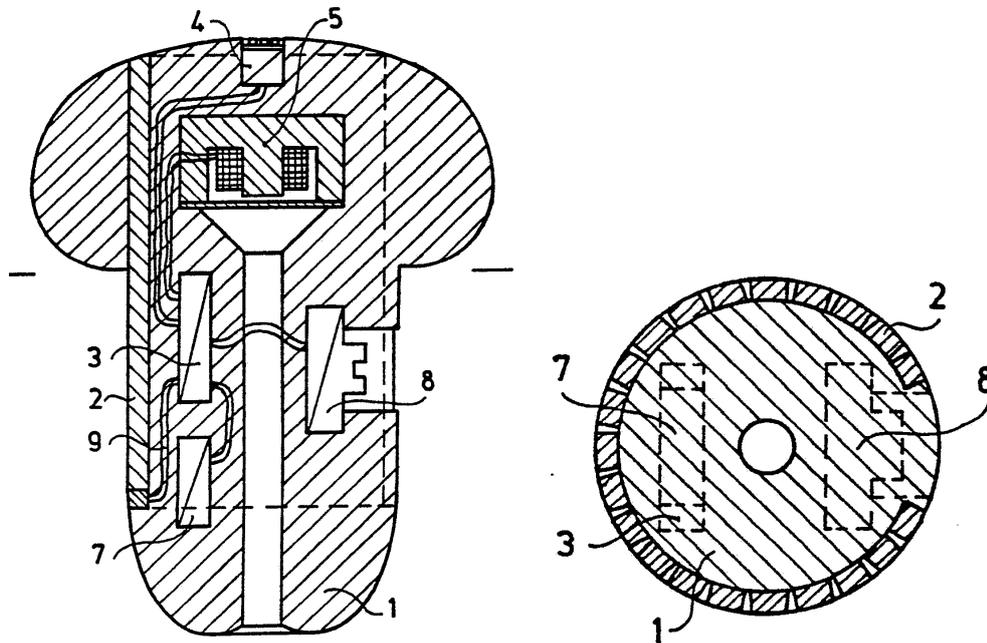
For example: Rechargeable battery (31) and battery charger 5 with charging contacts (51, 51')



For example: Fuel cell (6) with fuel cell tank (8). Valve (9) is used for filling the tank and with the help of window (10) the amount of fuel can be checked.



For example: Thermic semiconductor elements (2) arranged on the outer surface of hearing aid.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| For earphones and headphones | H04R 1/1025 |
| Reduction of energy consumption in hearing aids | H04R 2460/03 |
| Electrical supply for implants | A61N 1/378 |
| Fuel cells | H01M 8/00 |
| Secondary cells (accumulators) | H01M 10/00 |
| Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries | H02J 7/00 |

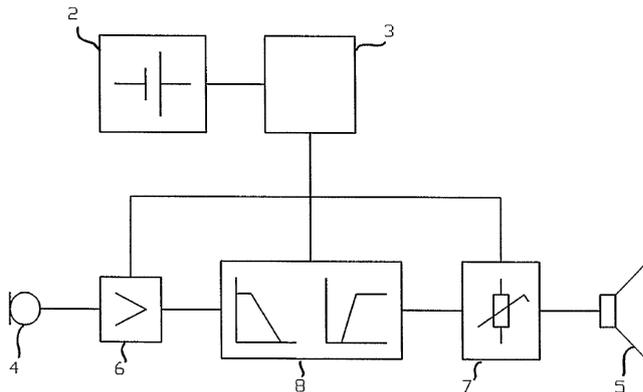
H04R 2225/33

Aspects relating to adaptation of the battery voltage, e.g. its regulation, increase or decrease

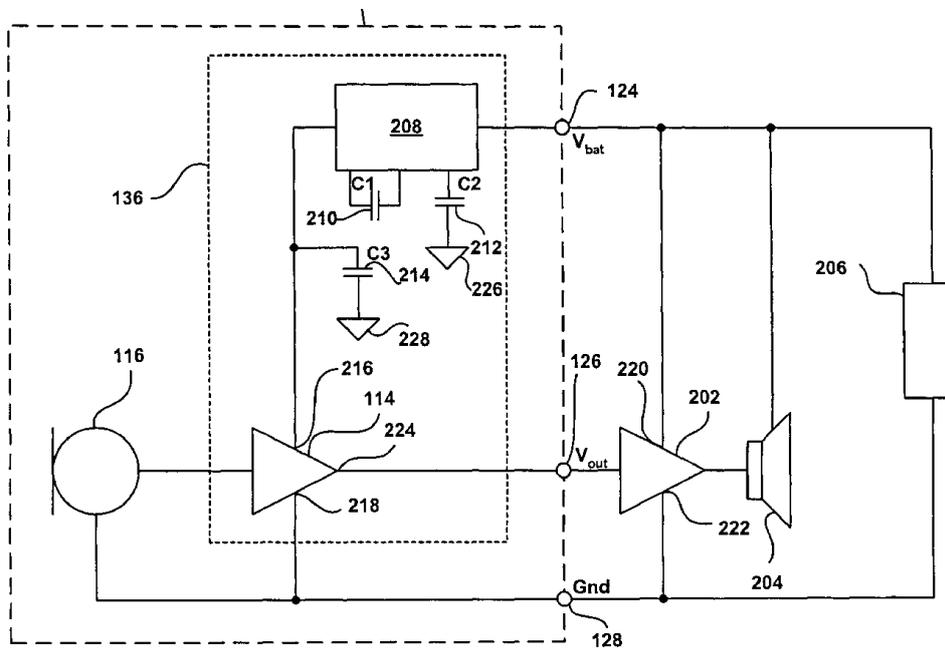
Definition statement

This place covers:

For example: A hearing aid comprises a step-down/step-up converter (3) as voltage regulator, which transforms both higher as well as lower operating voltage into at least one stabilised supply voltage.



For example: Power source (206) is connected to a charge pump and voltage regulator (208), which generates a larger or smaller output voltage depending on the value of the power source (206) and stabilises the output voltage.



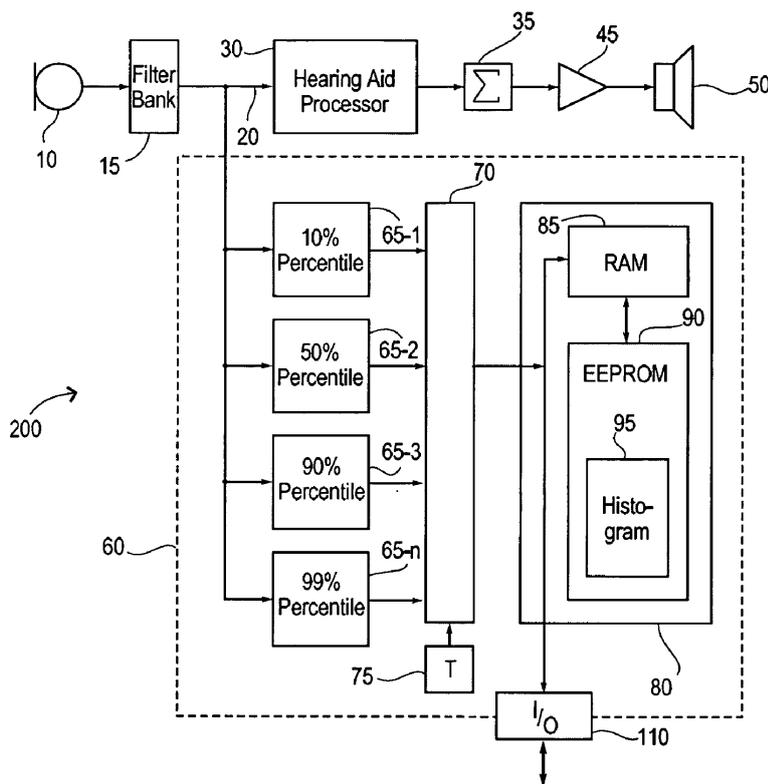
H04R 2225/39

Aspects relating to automatic logging of sound environment parameters and the performance of the hearing aid during use, e.g. histogram logging, or of user selected programs or settings in the hearing aid, e.g. usage logging

Definition statement

This place covers:

For example: Hearing aid with data logger (60) which logs data relating to sound environment, programs used, etc. The data stored can be used by subsequent fitting.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Hearing aid fitting | H04R 25/70 |
| Adaptation of hearing aid parameters to listening situation | H04R 2225/41 |

H04R 2225/41

Detection or adaptation of hearing aid parameters or programs to listening situation, e.g. pub, forest

Definition statement

This place covers:

For example: Acoustic scene identification method for hearing device, which involves extracting characteristic feature of input signal and generating revised class information in processing stages to characterize and identify acoustic scenes. The settings can be adapted to the encountered acoustic scene, if its characteristics are detected.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------------------|--------------------------------------|
| Listening situation | Acoustic scene, acoustic environment |
|---------------------|--------------------------------------|

H04R 2225/43

Signal processing in hearing aids to enhance the speech intelligibility

Definition statement

This place covers:

Application of speech processing techniques, e.g. formant processing, determination or use of speech intelligibility threshold, detection of voiced speech, to control a hearing aid to enhance speech intelligibility.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Speech enhancement, e.g. noise reduction or echo cancellation | G10L 21/02 |
| Speech enhancement using noise filtering characterised by the method used for estimating noise | G10L 21/0216 |

Special rules of classification

The mere mentioning of increasing speech intelligibility, which is a general aim for hearing aids, should not be classified.

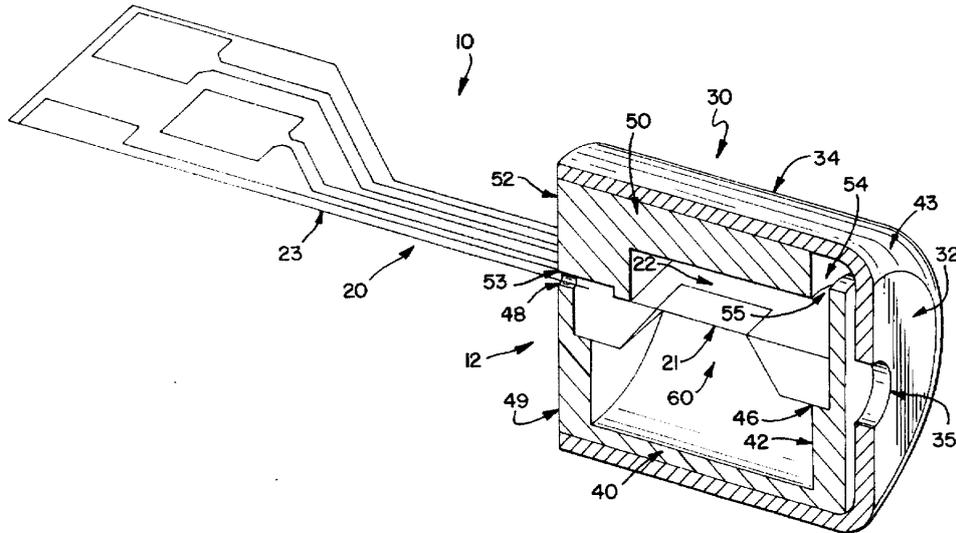
H04R 2225/49

Reducing the effects of electromagnetic noise on the functioning of hearing aids, by, e.g. shielding, signal processing adaptation, selective (de)activation of electronic parts in hearing aid

Definition statement

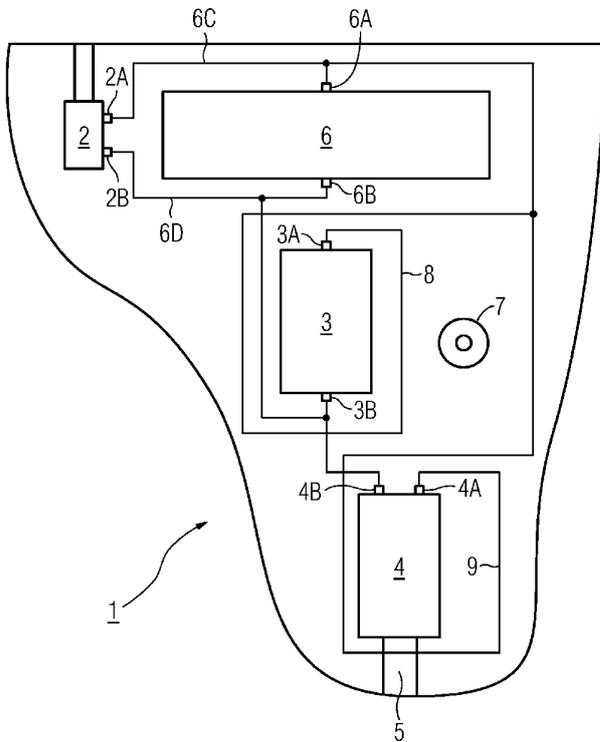
This place covers:

For example: Passive shielding of a microphone transducer (21) by metal jacket (30)



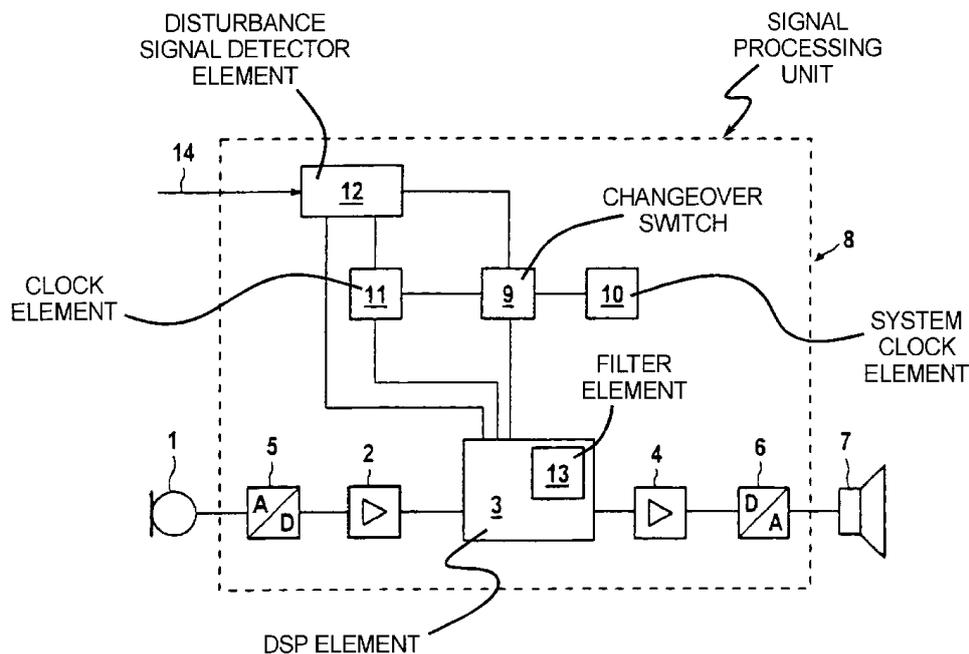
Definition statement

For example: Active shielding by attenuation loops (8, 9) to attenuate electromagnetic interference resulting from supply lines (6C, 6D, coming from battery (6)) or the amplifier (3) and receiver (4) at the site of antenna (7)



For example: Compensation for em-noise in signal processing:

A hearing aid receives the electromagnetic disturbance signal (14) via the detector element (12) and therefore detects the presence of, for example, a GSM telephone in the D1 network. The detector element (12) transmits the information about the detected noise field type (namely GSM telephone, D1 network) to the DSP element (3), so that the filter element (13) can be configured in a way that is adapted to the detected noise field type for the particularly effective noise field suppression.)



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| MEMS packages for protecting against electromagnetic or electrostatic interferences | B81B 7/0064 |
| Measuring electromagnetic field characteristics | G01R 29/08 |
| Screening of apparatus or components against electric or magnetic fields | H05K 9/00 |

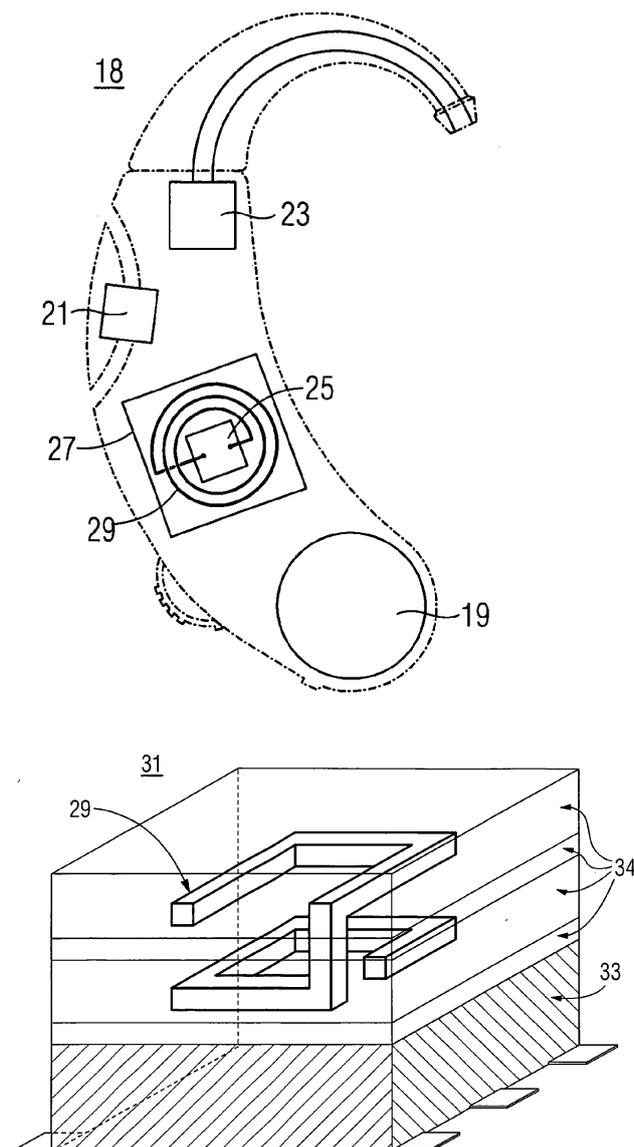
H04R 2225/51

Aspects of antennas or their circuitry in or for hearing aids

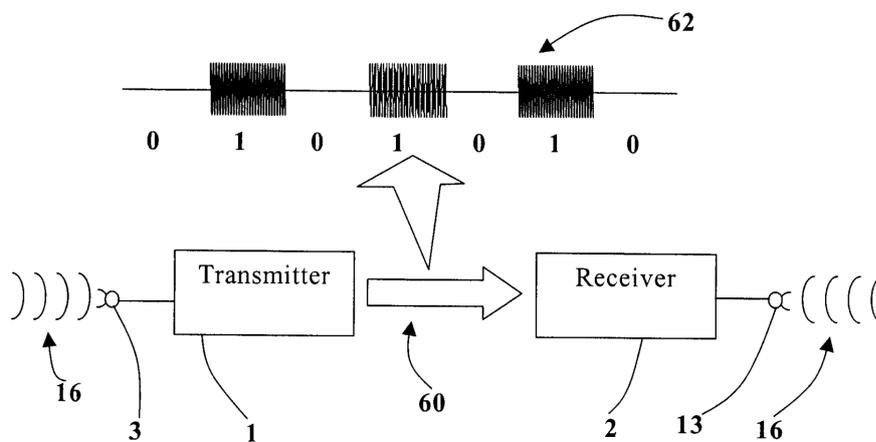
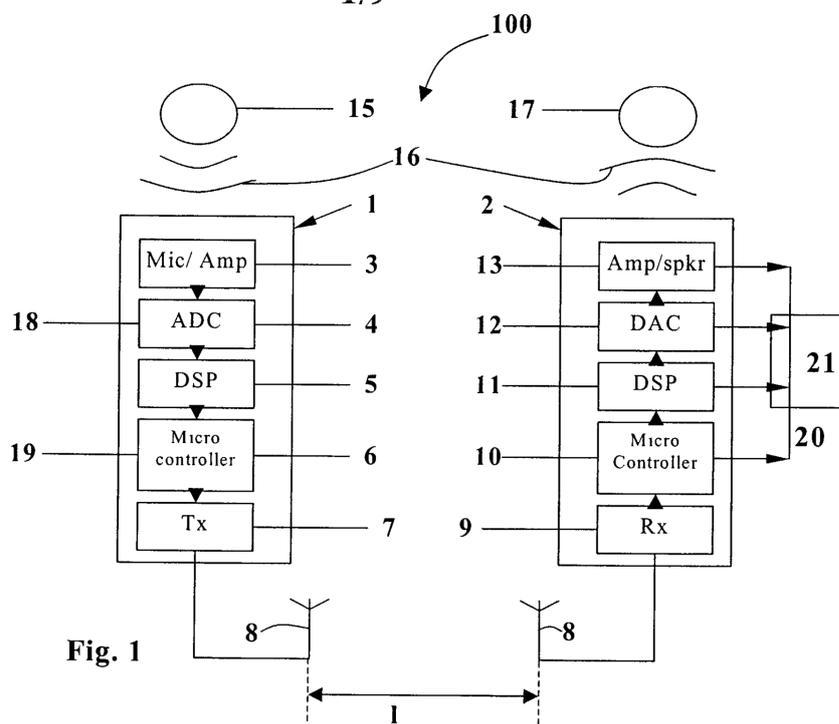
Definition statement

This place covers:

For example: Construction of the antenna



For example: Circuitry for transmitting signal between hearing aid (2) and an external device (1):



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Adaptation of aerials for carrying or wearing by persons or animals | H01Q 1/273 |
| Aerials using equipment having another main function to serve additionally as an aerial | H01Q 1/44 |
| Loop aerials | H01Q 7/00 |

H04R 2225/53

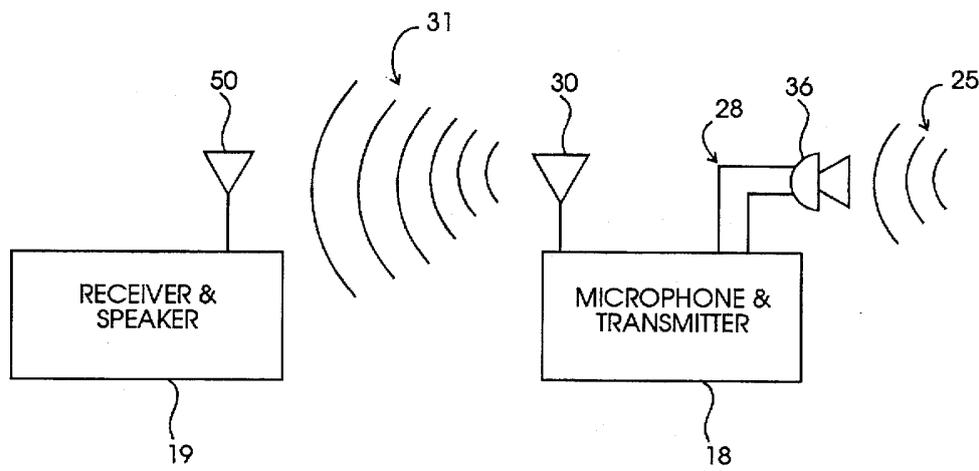
Hearing aid for unilateral hearing impairment using Contralateral Routing Of Signals [CROS]

Definition statement

This place covers:

For example: Sound delivered to the deaf ear (18) is sent to the other ear (19) and processed to maintain some directional hearing.

If the other ear is also impaired it is called Bi-CROS.



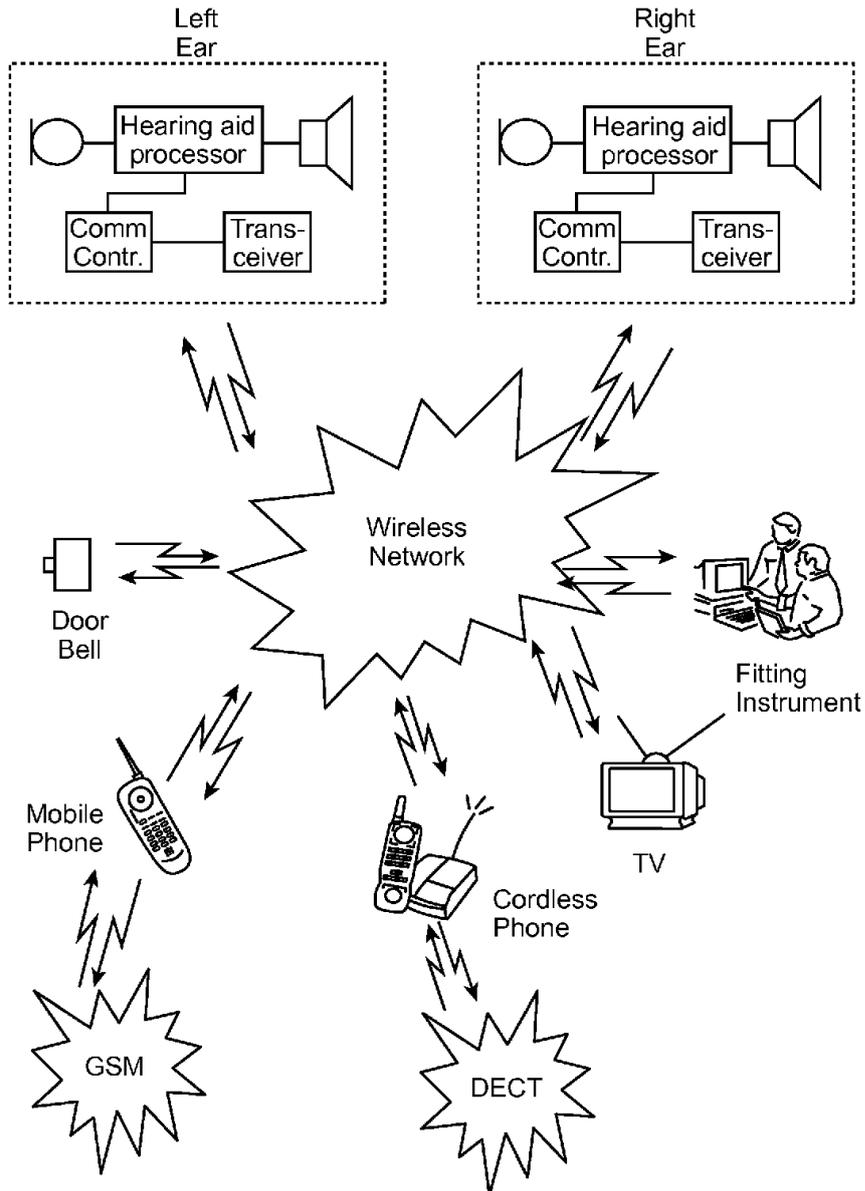
H04R 2225/55

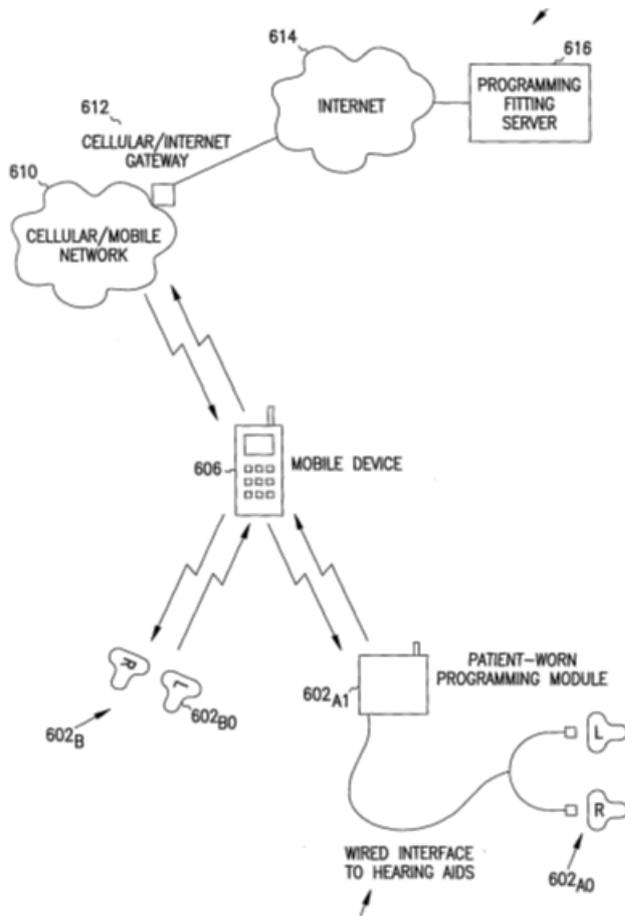
Communication between hearing aids and external devices via a network for data exchange

Definition statement

This place covers:

For example:





References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Remote monitoring using telemetry, e.g. using a communication network | A61B 5/0002 |
| Home automation networks, e.g. Home Audio Video Interoperability [HAVI] networks | H04L 12/2803 |

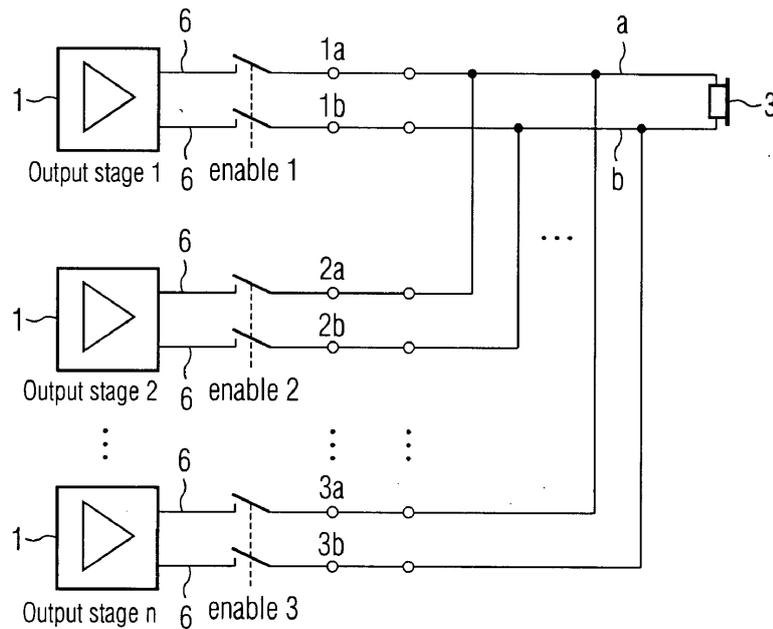
H04R 2225/59

Arrangements for selective connection between one or more amplifiers and one or more receivers within one hearing aid

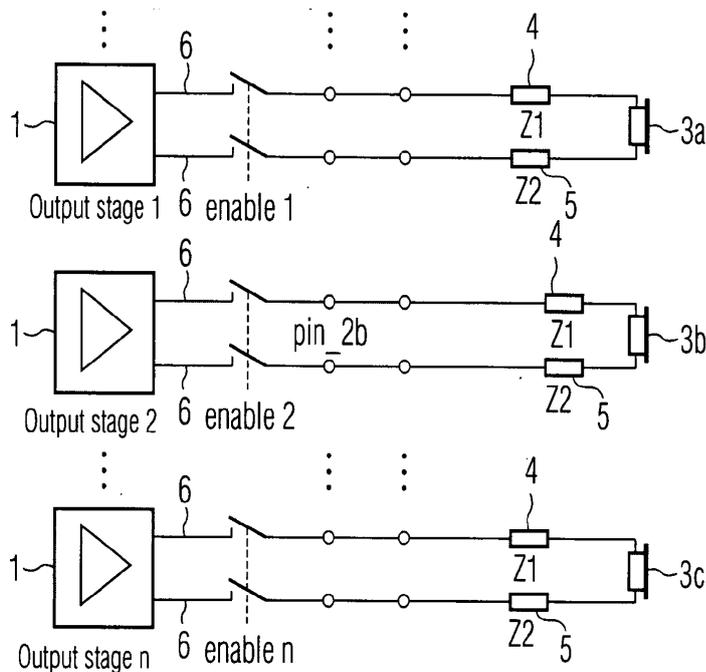
Definition statement

This place covers:

For example: multiple amplifiers to one single receivers



For example: multiple amplifiers to multiple receivers, with same or different characteristics



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| For stereophonic purposes | H04R 5/04 |
| Connection circuits to selectively connect loudspeakers or headphones to amplifiers | H04R 2420/03 |

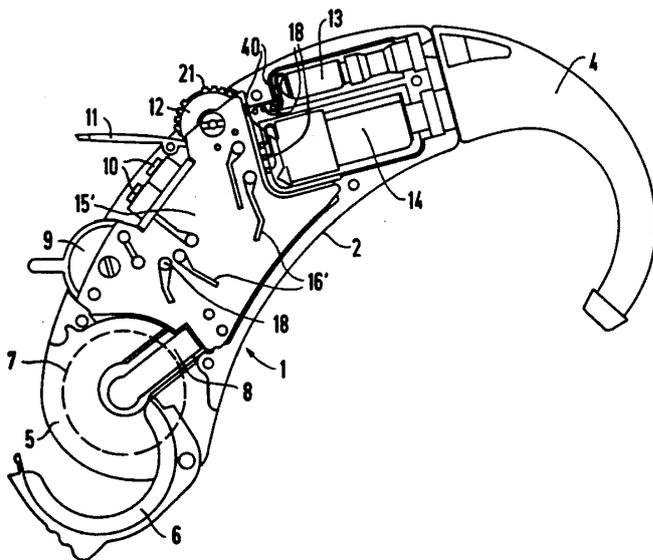
H04R 2225/61

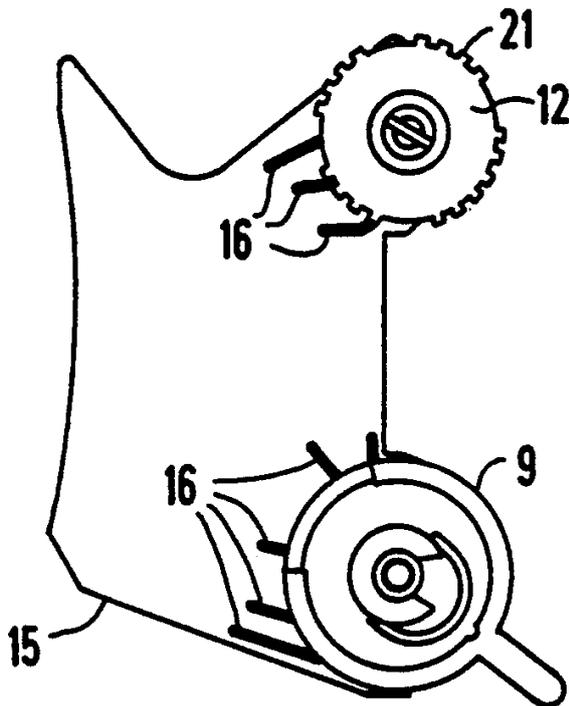
Aspects relating to mechanical or electronic switches or control elements, e.g. functioning

Definition statement

This place covers:

For example:





References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-------------------------------|
| For earphones or headphones | H04R 1/1041 |
| Electronic input selection or mixing based on input signal analysis, e.g. mixing or selection between microphone and telecoil or between microphones with different directivity characteristics (H04R 25/407 takes precedence) | H04R 25/43 |
| Signal processing in hearing aids to enhance the speech intelligibility | H04R 2225/43 |
| Switching (mechanical) in general | H01H |
| Switches in or for hearing aids in general | H01H 2300/004 |
| Electronic switching in general | H03K 17/00 |

H04R 2225/67

Implantable hearing aids or parts thereof not covered by [H04R 25/606](#)

Definition statement

This place covers:

Implantable hearing aids or parts thereof, e.g. receivers, housings, whereas in [H04R 25/606](#) the emphasis is on the mounting of the transducers.

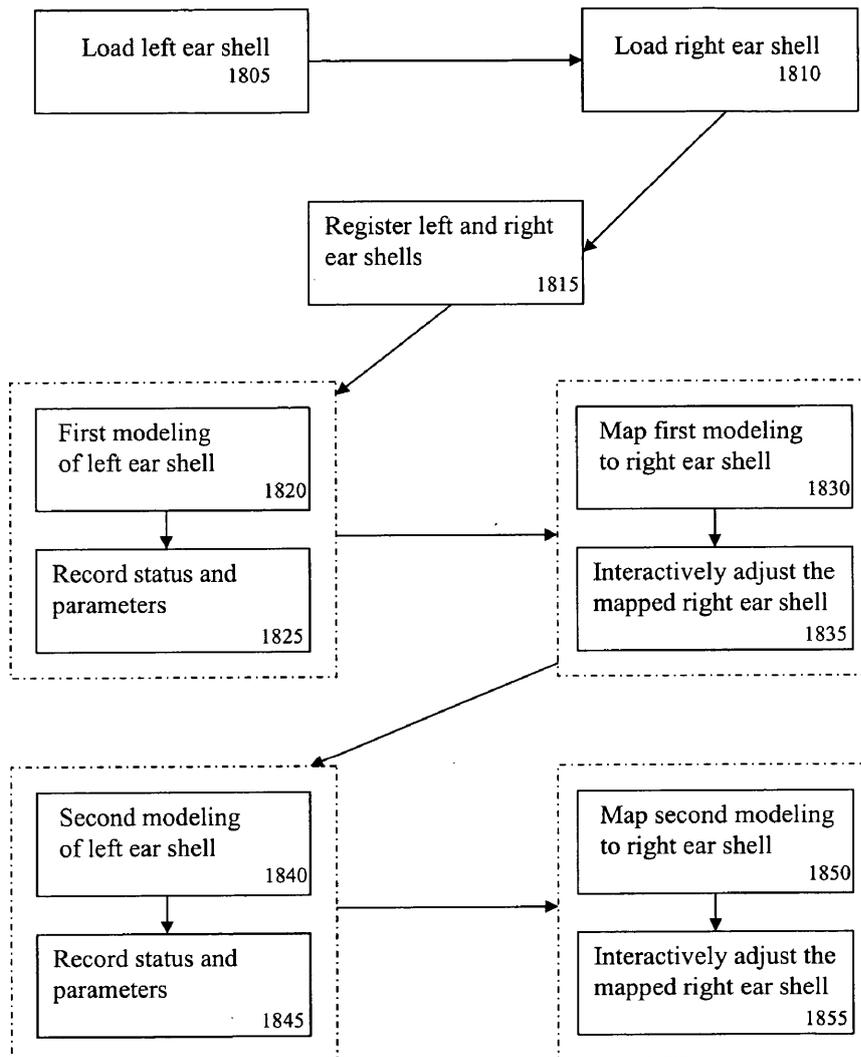
H04R 2225/77

Design aspects, e.g. CAD, of hearing aid tips, moulds or housings

Definition statement

This place covers:

For example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|----------------------------------|----------------------------|
| Computer aided design in general | G06F 30/00 |
|----------------------------------|----------------------------|

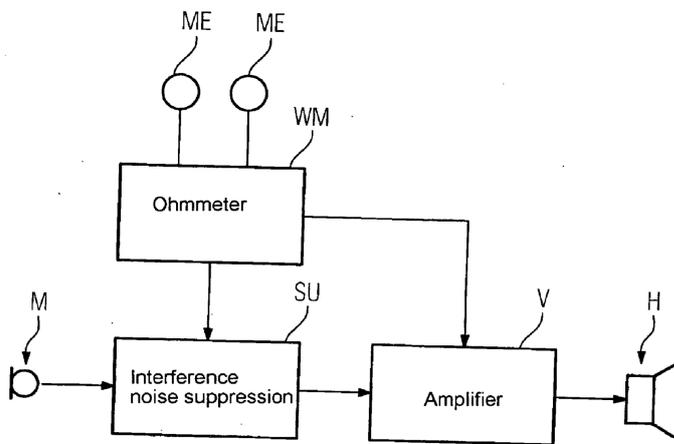
H04R 2225/81

Aspects of electrical fitting of hearing aids related to problems arising from the emotional state of a hearing aid user, e.g. nervousness or unwillingness during fitting

Definition statement

This place covers:

For example: The ohmic resistance of the skin is measured. Under stress the ohmic resistance reduces due to sweating. Thus this resistance can be taken as a measure of psychoacoustic variables, e.g. loudness, sharpness, audio stress, etc.



H04R 2225/83

Aspects of electrical fitting of hearing aids related to problems arising from growth of the hearing aid user, e.g. children

Definition statement

This place covers:

For example: compensation for the change in characteristics of a child's ear during growth

H04R 2227/001

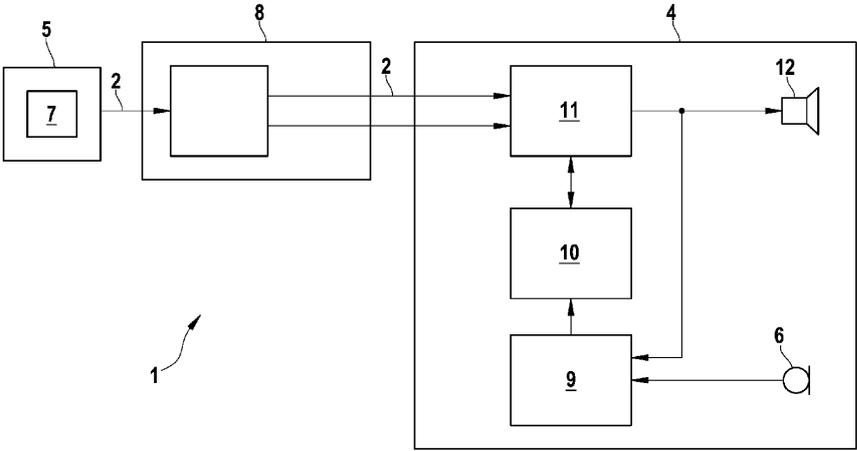
Adaptation of signal processing in PA systems in dependence of presence of noise

Definition statement

This place covers:

Adaptation of the signal processing is generally done by sensing the interference signal or noise. For example: A PA system has two audio inputs (6, 7) provided for interference signal and a utility signal, respectively. An adjustment device (11) adjusts the utility signal with the interference signal in such

manner that a modified utility signal is produced. An audio output is provided for the modified utility signal. The interference signal contains information about local distribution of static noises.



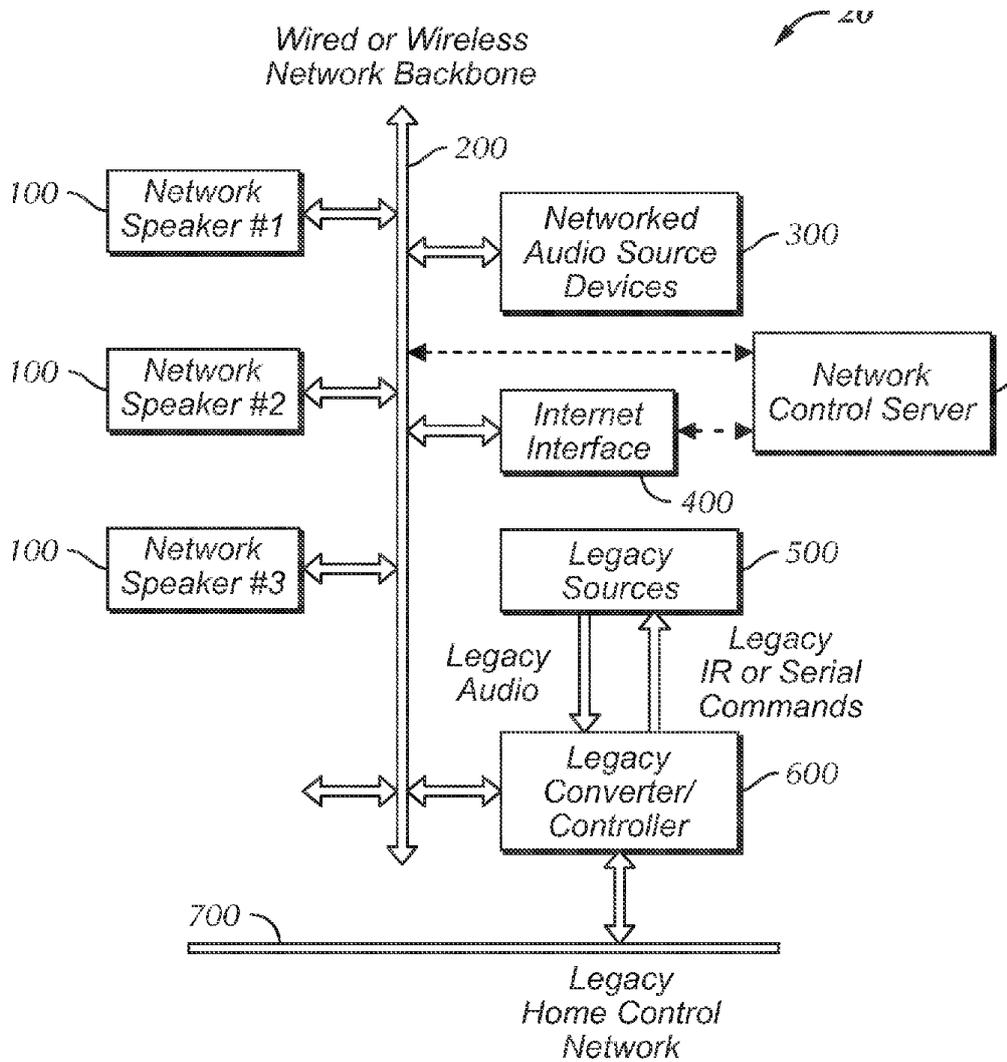
H04R 2227/003

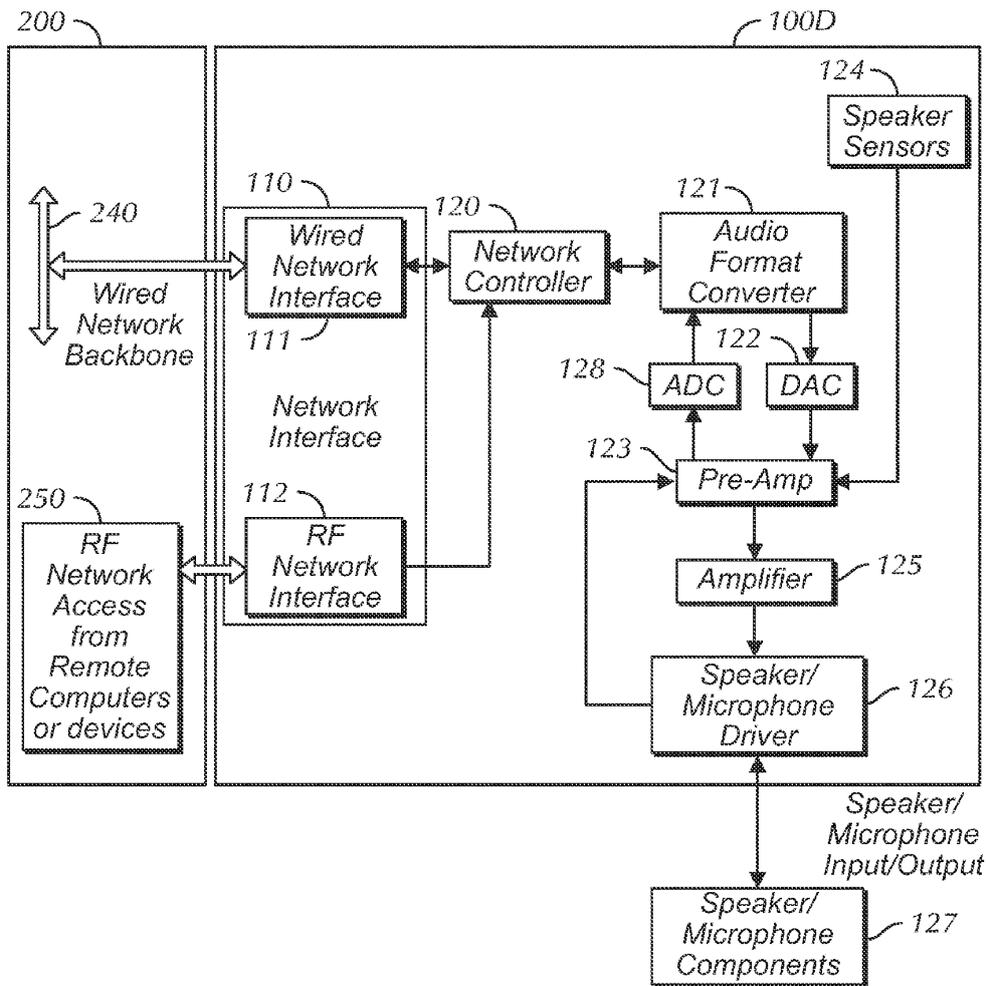
Digital PA systems using, e.g. LAN or internet

Definition statement

This place covers:

For example:





References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Home automation networks, e.g. Home Audio Video Interoperability [HAVI] networks | H04L 12/2803 |
|--|------------------------------|

H04R 2227/005

Audio distribution systems for home, i.e. multi-room use

Definition statement

This place covers:

For example:

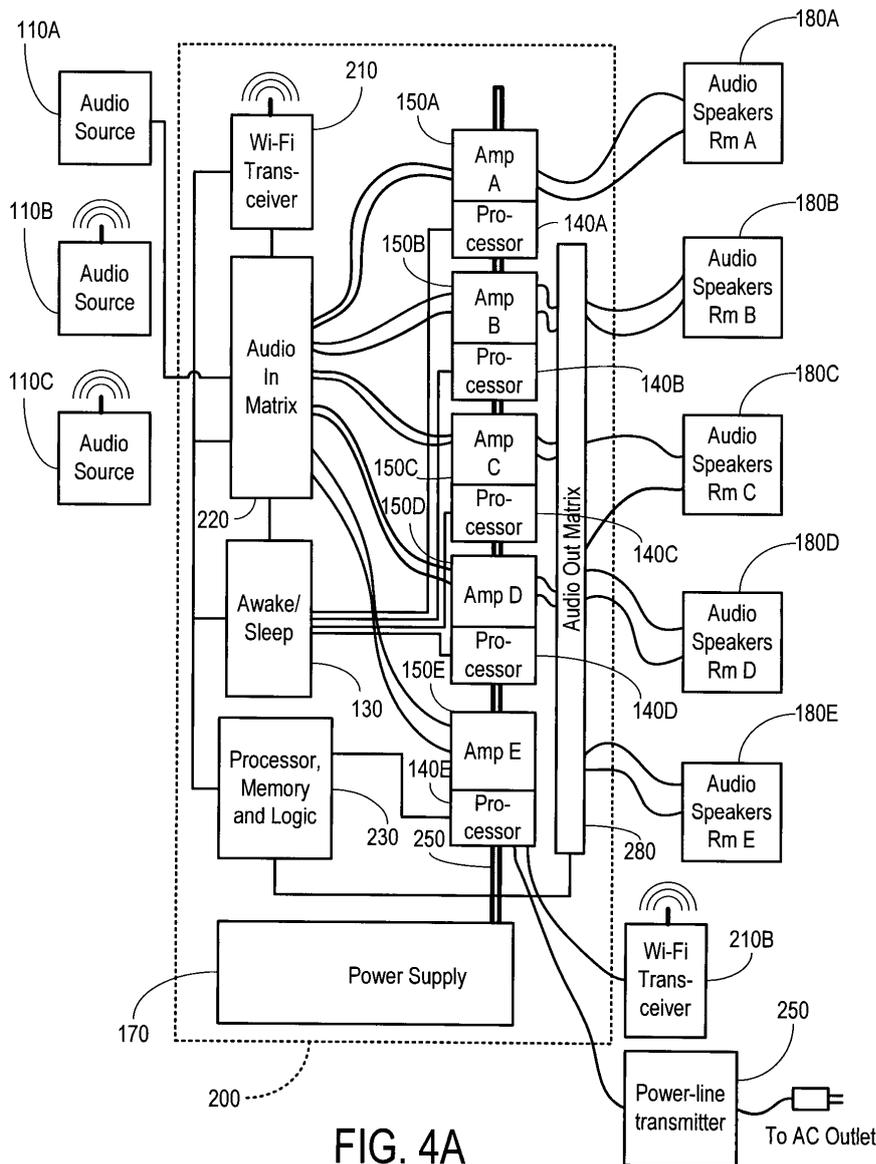


FIG. 4A

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Receiver circuits for HiFi systems or audio/video combinations | H04B 1/20 |
| Audio mixers | H04H 60/00 |

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------|------|
| Room | zone |
|------|------|

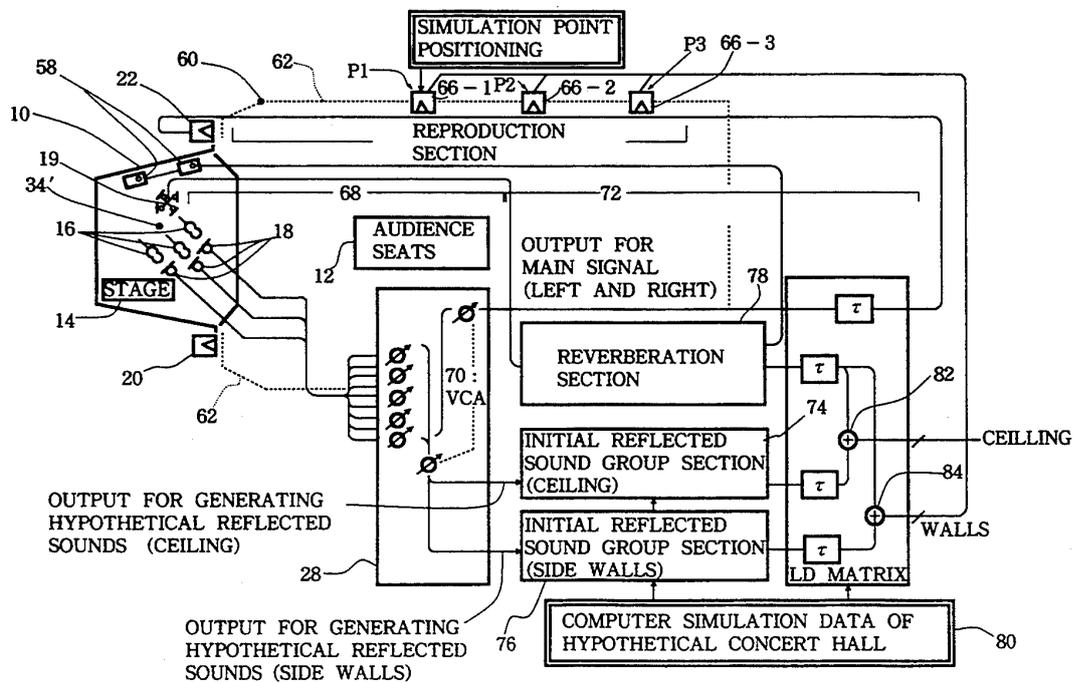
H04R 2227/007

Electronic adaptation of audio signals to reverberation of the listening space for PA

Definition statement

This place covers:

For example: reverberation adaptation for indoor or outdoor venues for PA-systems.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|----------------------------|
| Measuring reverberation time; Room acoustic measurements | G01H 7/00 |
| Arrangements for producing a reverberation or echo sound | G10K 15/08 |
| For stereophonic systems | H04S 7/305 |

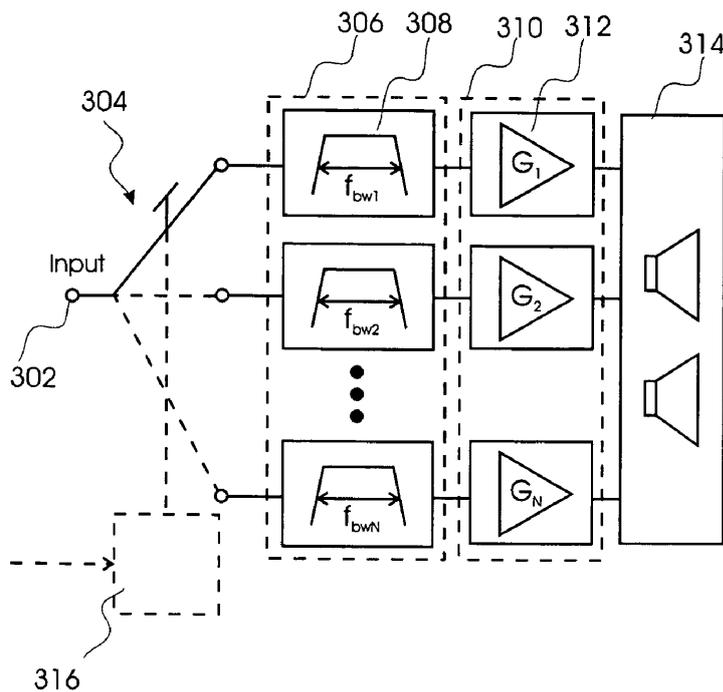
H04R 2227/009

Signal processing in [PA] systems to enhance the speech intelligibility

Definition statement

This place covers:

For example: Amplifiers (312) have the amplification gain, which is the function of the bandwidth (308) of the filter (306), thus effectively augmenting the speech in noisy conditions, and hence preserving the overall sound pressure level and increasing speech intelligibility. The appropriate amplifier/filter combination is selected by a switch (304), which can be manually or automatically controlled by a switch controller (316) (cf. figure).



For example: A method involves sensing the ambient sound in a region for a predetermined time interval, analyzing sensed ambient sound and overlaying ambient sound with test audio signals having predetermined characteristics. The overlaid ambient sound is sensed. The degradation of speech

intelligibility beyond acceptable level is determined by analyzing ambient sound pressure level and ambient frequency domain characteristics (cf. figure).

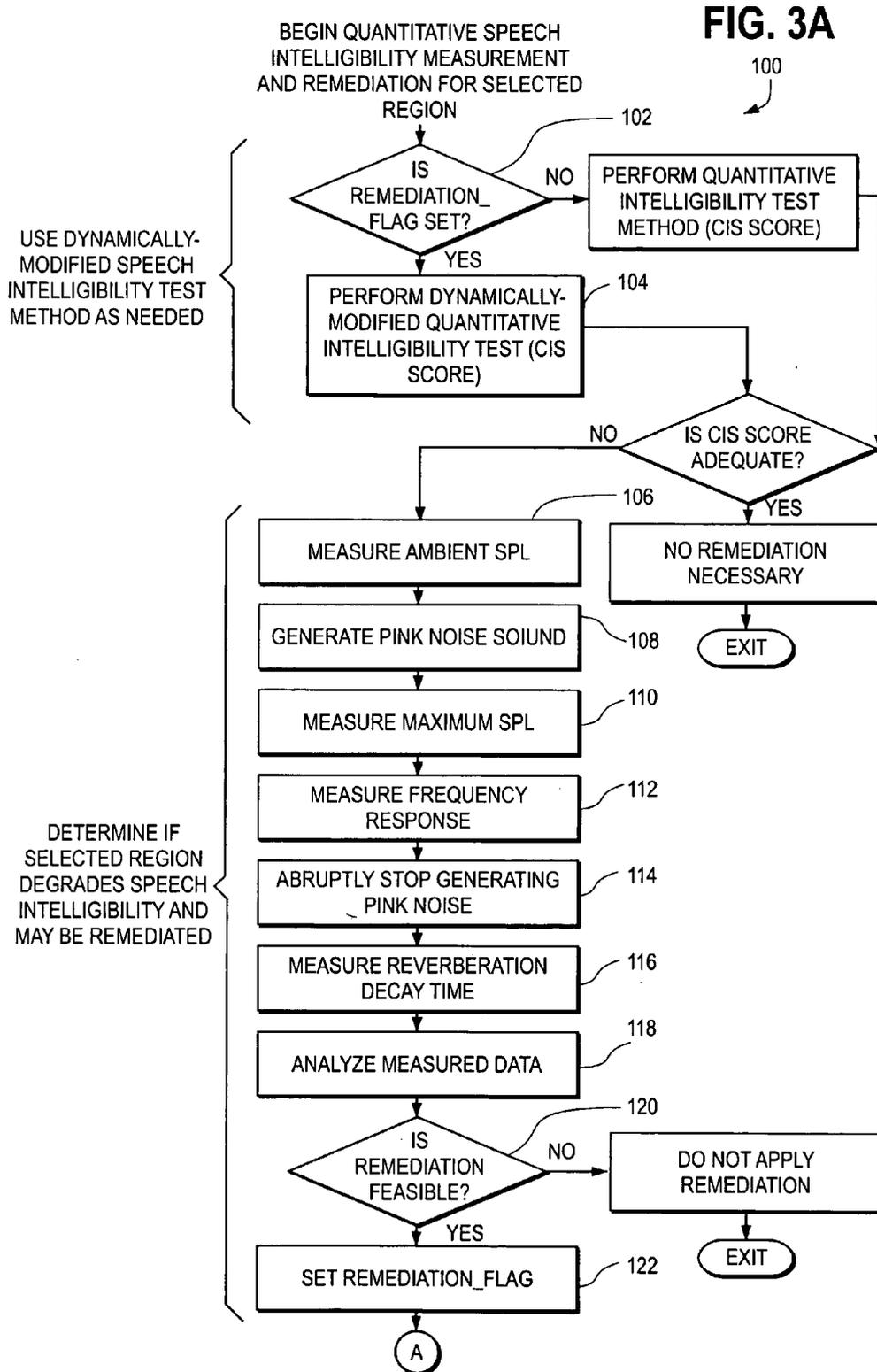
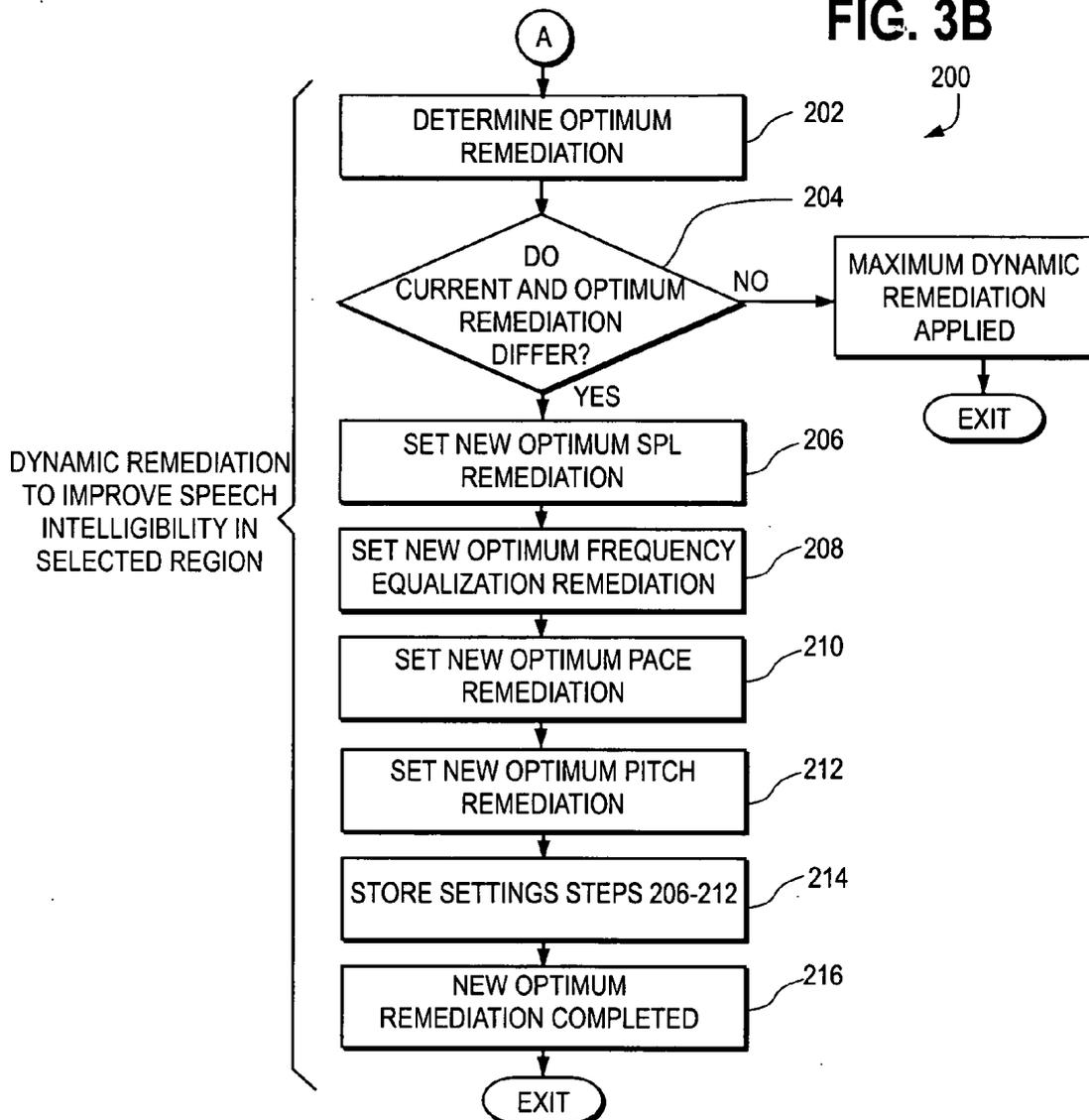


FIG. 3B



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---------------------------------|
| Speech enhancement using two microphones, one receiving mainly the noise signal and the other one mainly the speech signal | G10L 2021/02165 |
|--|---------------------------------|

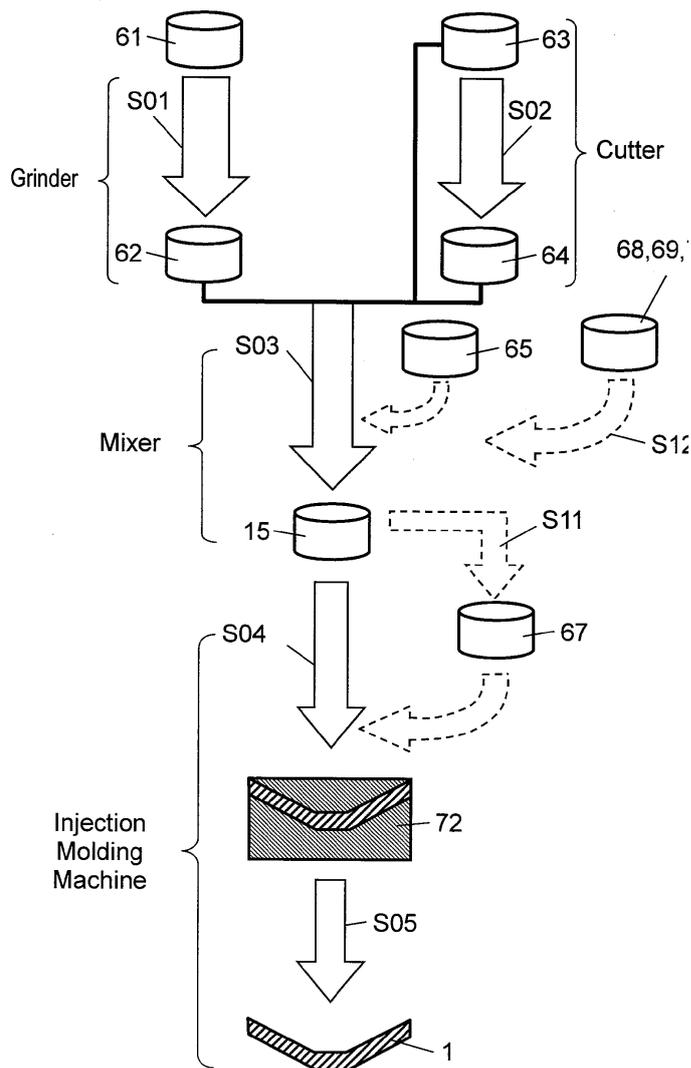
H04R 2231/001

Moulding aspects of diaphragm or surround

Definition statement

This place covers:

For example: Polypropylene pellets (61) are grinded (S01) to prepare granulated polypropylene resin (62). Fibres 63 are partly cut (S02; 64) and mixed (S03) with the resin to produce a compound (15) which can be injection moulded (S04, S05) to produce a loudspeaker diaphragm.



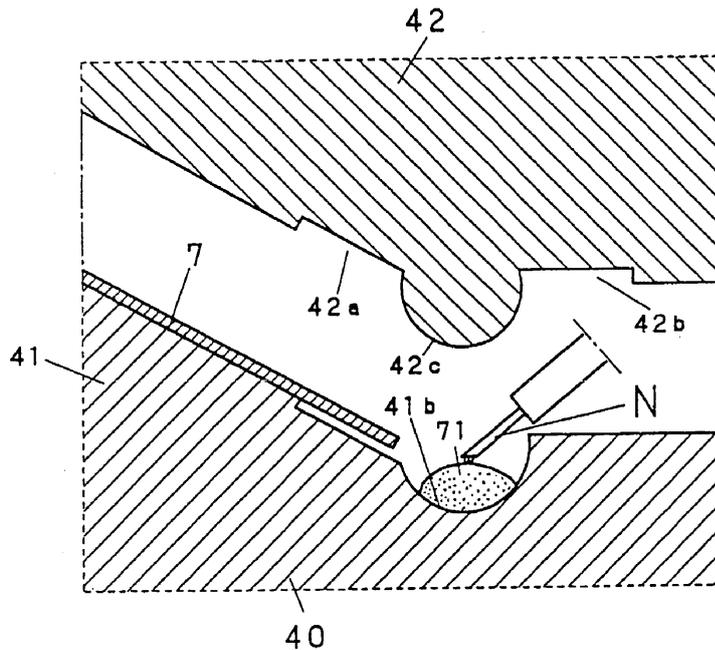
H04R 2231/003

Manufacturing aspects of the outer suspension of loudspeaker or microphone diaphragms or of their connecting aspects to said diaphragms

Definition statement

This place covers:

For example: Surround press-moulded onto a loudspeaker diaphragm (7)



H04R 2307/023

Diaphragms comprising ceramic-like materials, e.g. pure ceramic, glass, boride, nitride, carbide, mica and carbon materials

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---------------------|----------------------------|
| Anodizing of metals | C25D 11/00 |
|---------------------|----------------------------|

H04R 2307/025

Diaphragms comprising polymeric materials

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Moulding aspects of diaphragm or surround | H04R 2231/001 |
| Moulding of plastics | B29C 43/00 , B29C 45/00 , B29C 48/00 , B29C 49/00 |

| | |
|--------------------------------|----------------------------|
| Shaping of plastics in general | B29C 67/00 |
|--------------------------------|----------------------------|

H04R 2307/027

Diaphragms comprising metallic materials

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|----------------|--|
| Electroplating | C25D 3/00 , C25D 5/00 , C25D 7/00 , C25D 9/00 |
|----------------|--|

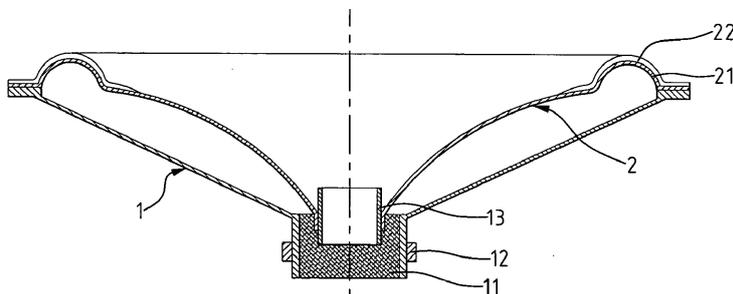
H04R 2307/201

Damping aspects of the outer suspension of loudspeaker diaphragms by addition of additional damping means

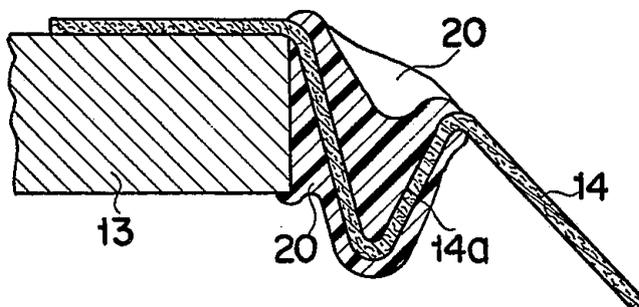
Definition statement

This place covers:

For example: membrane (2) is extended to form outer suspension (21), whose elastic properties are adapted by the elastic layer (22).



For example: dampening material (20) for the edge (14a)



Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------------------|----------|
| Outer suspension | surround |
|------------------|----------|

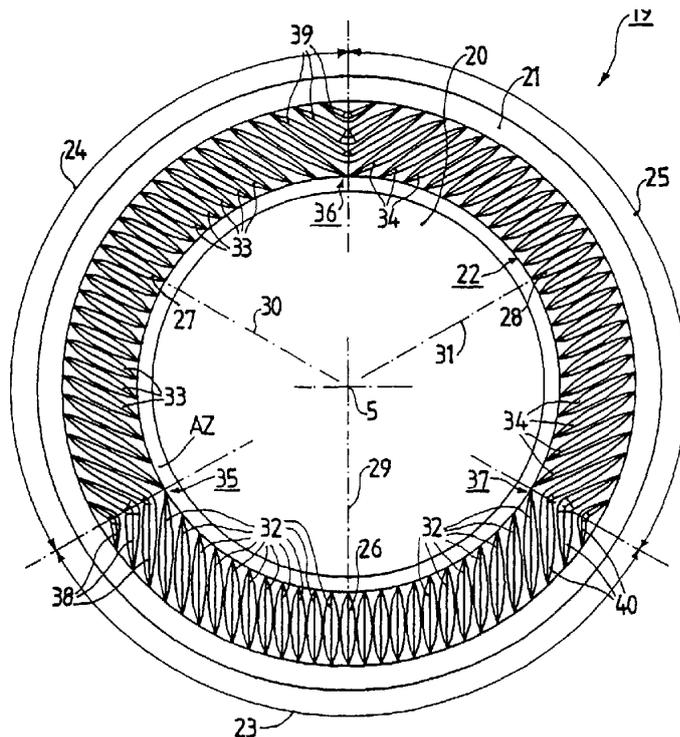
H04R 2307/207

Shape aspects of the outer suspension of loudspeaker diaphragms

Definition statement

This place covers:

For example: Pleats (26,27, 28,32, 33,34, 38,39, 40) are provided in the outer suspension in such a way the vibration of membrane is more uniform over the frequency range the transducer is to be used for.



Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|------------------|----------|
| Outer suspension | surround |
|------------------|----------|

H04R 2400/00

Loudspeakers

Special rules of classification

Only for those cases where the classification does not allow specification the type of transducer and the type is important, e.g. frequency control circuit ([H04R 3/04](#) and subgroups) may require different circuit for microphones or for loudspeakers

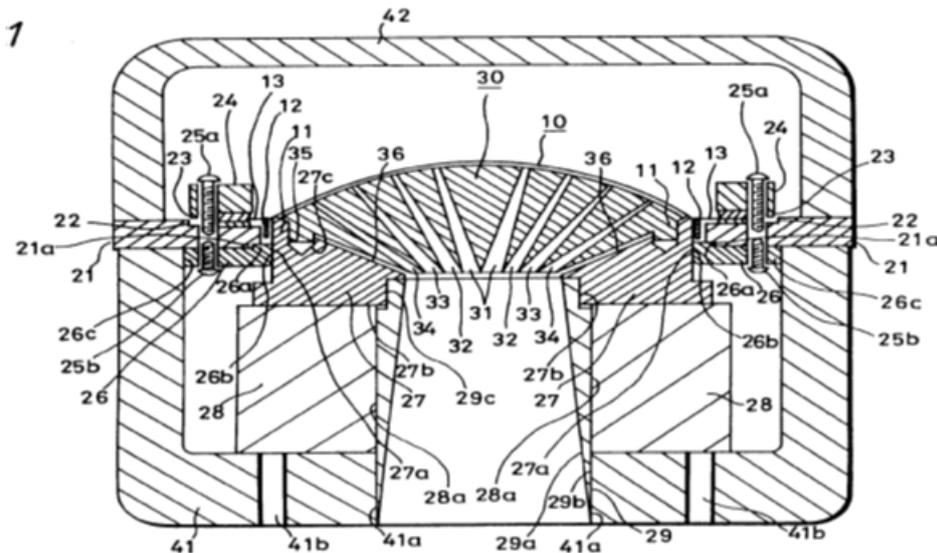
H04R 2400/13

Use or details of compression drivers

Definition statement

This place covers:

For example: Details of construction of a compression driver.



H04R 2410/00

Microphones

Special rules of classification

Only for those cases where the classification does not allow specification the type of transducer and the type is important, e.g. frequency control circuit ([H04R 3/04](#) and subgroups) may require different circuit for microphones or for loudspeakers

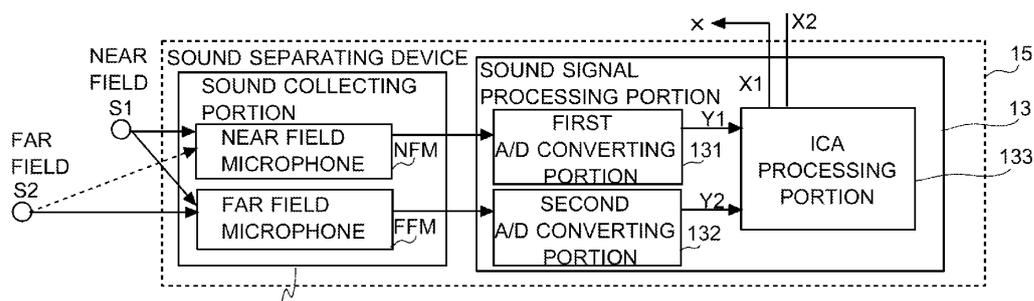
H04R 2410/01

Noise reduction using microphones having different directional characteristics

Definition statement

This place covers:

For example: In this particular example the far field microphone is omnidirectional and the near field microphone is directional



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Electronic input selection in hearing aids based on input signal analysis | H04R 25/43 |
|---|----------------------------|

H04R 2410/03

Reduction of intrinsic noise in microphones

Definition statement

This place covers:

Intrinsic noise is the noise which is generated inside the microphone (transducer) without any ambient acoustic signal (noise) being present, e.g. noise caused by parasitic capacitances in MEMS microphones or thermal noise.

H04R 2410/05

Noise reduction with a separate noise microphone

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---------------------------------|
| Speech enhancement using two microphones, one receiving mainly the noise signal, and the other one mainly the speech signal | G10L 2021/02165 |
|---|---------------------------------|

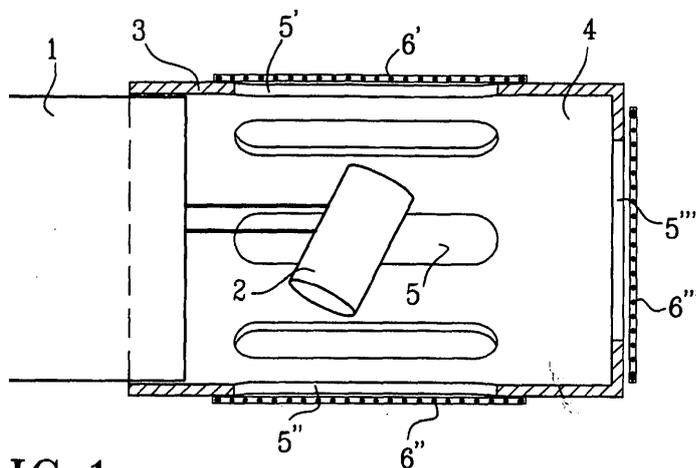
H04R 2410/07

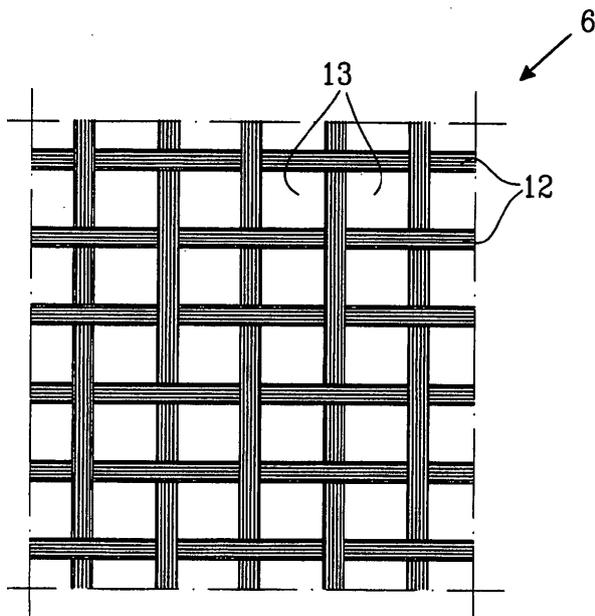
Mechanical or electrical reduction of wind noise generated by wind passing a microphone

Definition statement

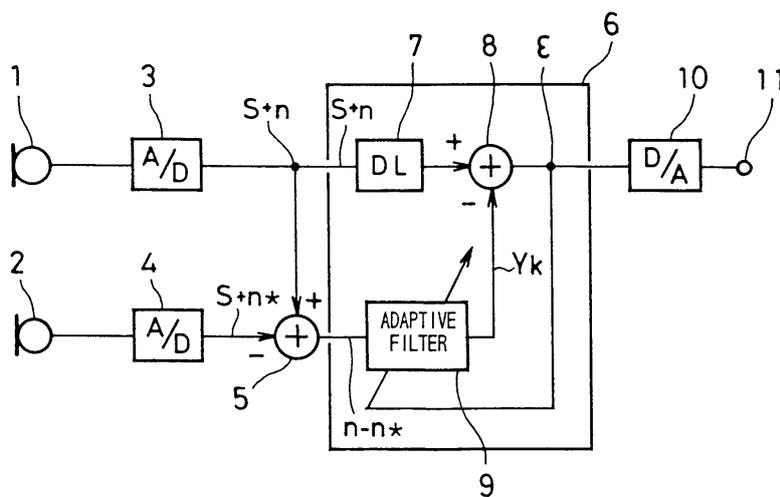
This place covers:

For example: mechanical reduction with the help of a mesh (6,6',6") over the sound openings (5,5',5") of a microphone





For example: electrical reduction using primary microphone (1) and a reference microphone (2) placed closely together. The microphone signals are input to adaptive noise canceller (6) (cf. Figure below).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Speech enhancement using noise filtering | G10L 21/02 |
| Speech enhancement using noise filtering characterised by the method used for estimating noise | G10L 21/0216 |

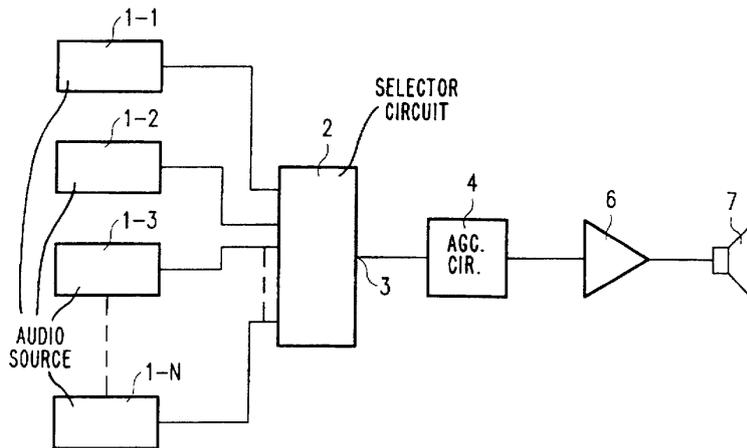
H04R 2420/01

Input selection or mixing for amplifiers or loudspeakers (for hearing aids H04R 25/43)

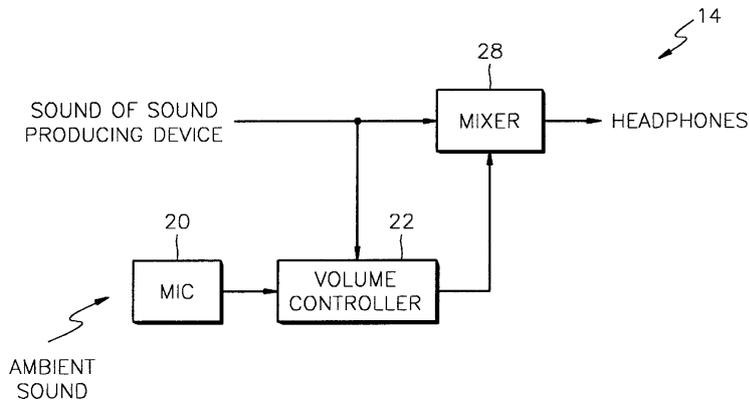
Definition statement

This place covers:

For example: selection



For example: mixing



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--------------|----------------------------|
| Audio mixers | H04H 60/00 |
|--------------|----------------------------|

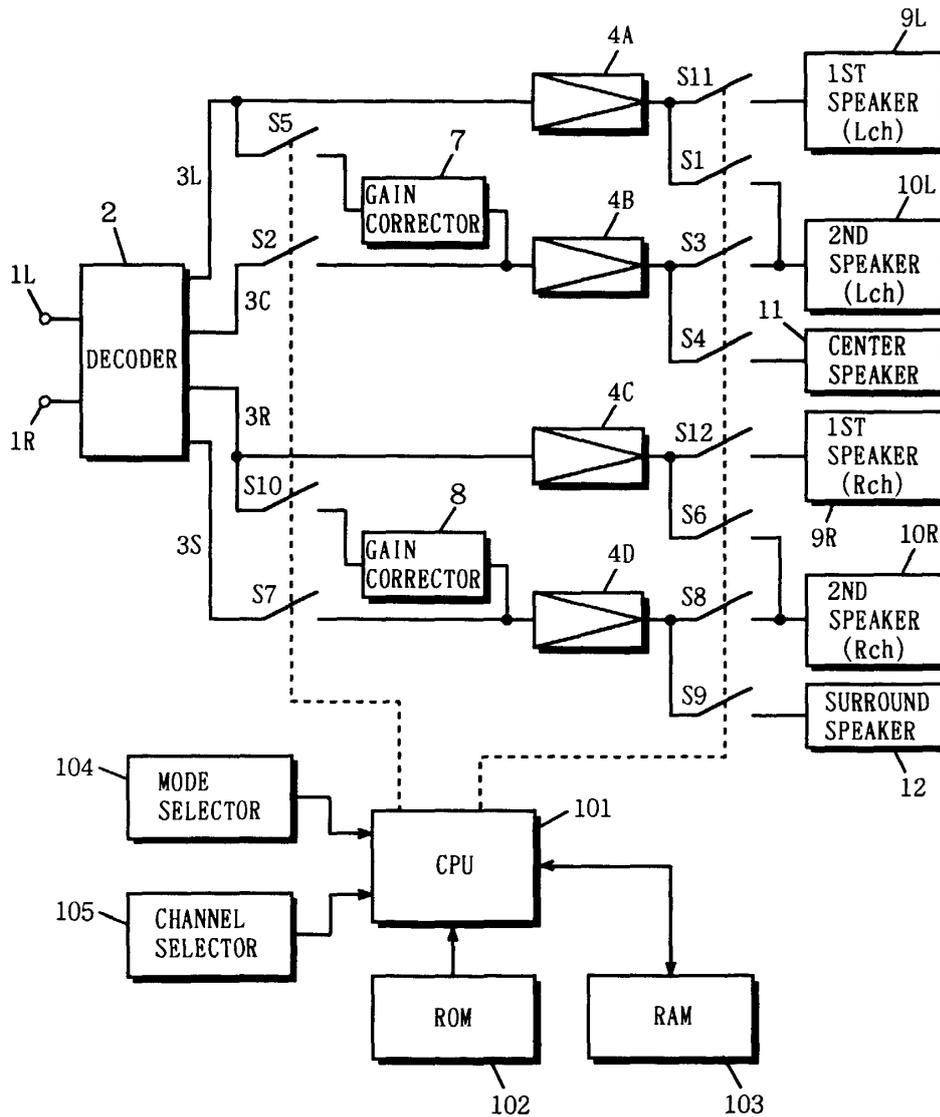
H04R 2420/03

Connection circuits to selectively connect loudspeakers or headphones to amplifiers

Definition statement

This place covers:

For example:



References

Limiting references

This place does not cover:

| | |
|------------------------|----------------------------|
| Public address systems | H04R 27/00 |
|------------------------|----------------------------|

H04R 2420/05

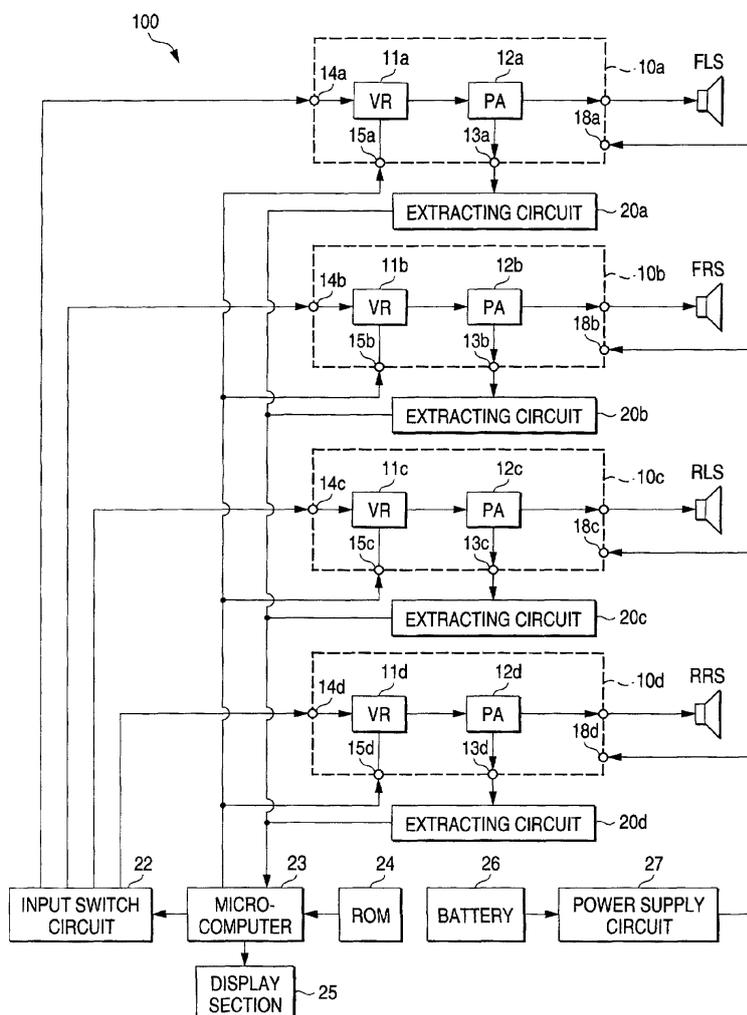
Detection of connection of loudspeakers or headphones to amplifiers

Definition statement

This place covers:

Detection of state of connection of acoustic transducers, microphones, loudspeakers and headphones to amplifiers

For example: The information apparatus (100) includes speakers (FLS, FRS, RLS, RRS) connected to the amplifiers (12a-12d). An input switch circuit (22) performs the input of a predetermined inspection signal into the amplifier. A microcomputer (23) determines whether the speaker is connected to the amplifier based on a signal to be inspected which is produced from the input inspection signal in the input switch circuit (cf. Figure).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|-----------------------------|
| Means for preventing incorrect coupling by indicating incorrect coupling; by indicating correct or full engagement | H01R 13/641 |
|--|-----------------------------|

Special rules of classification

To be used in combination with [H04R 5/04](#) (stereophonic) or [H04R 29/00](#) (not stereophonic) (or its subgroups) to indicate detection of connection.

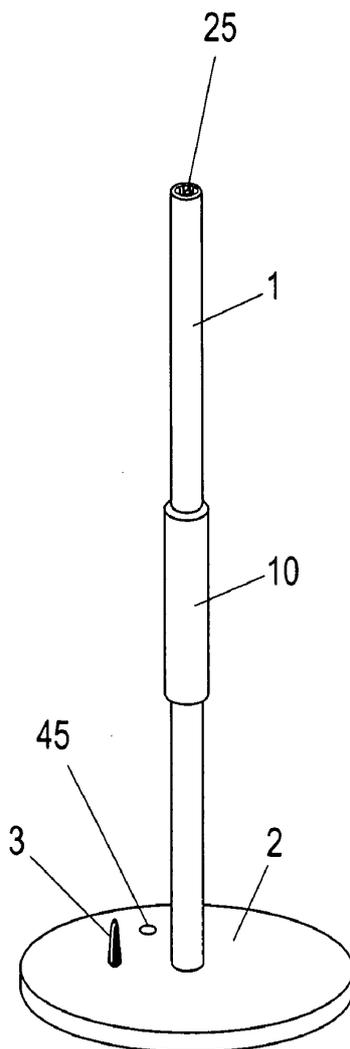
H04R 2420/07

Applications of wireless loudspeakers or wireless microphones

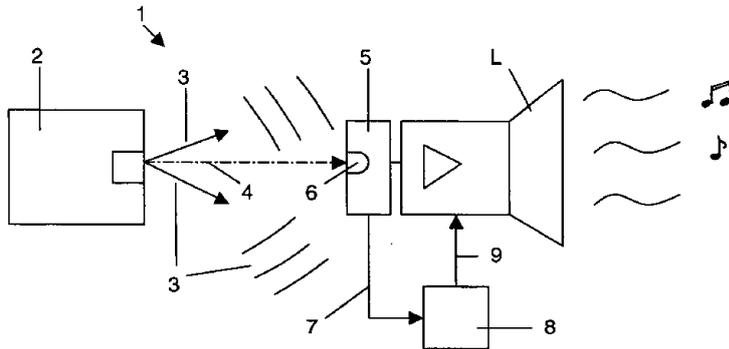
Definition statement

This place covers:

For example: stand for a microphone (not shown) having an antenna (3) and a transmitter (45))



For example: loudspeaker



References

Limiting references

This place does not cover:

| | |
|--------------------------------------|-----------------------------|
| Wireless connection for hearing aids | H04R 25/554 |
|--------------------------------------|-----------------------------|

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Arrangements for transmitting signals characterised by the use of a wireless electrical link. | G08C 17/00 |
| Portable transmitters | H04B 1/034 |
| Near-field transmission systems | H04B 5/00 |
| Indoor or near-field type systems for optical communication | H04B 10/114 |
| Hands-free substation equipment including a wireless connection or interface | H04M 1/6066 ; H04M 1/6091 |

Special rules of classification

The mere fact that a wireless connection for data transfer is used should not be classified.

H04R 2420/09

Applications of special connectors, e.g. USB, XLR, in loudspeakers, microphones or headphones

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| External connectors, e.g. plugs, modules for hearing aids | H04R 25/556 |
|---|-----------------------------|

H04R 2430/01

Aspects of volume control, not necessarily automatic, in sound systems

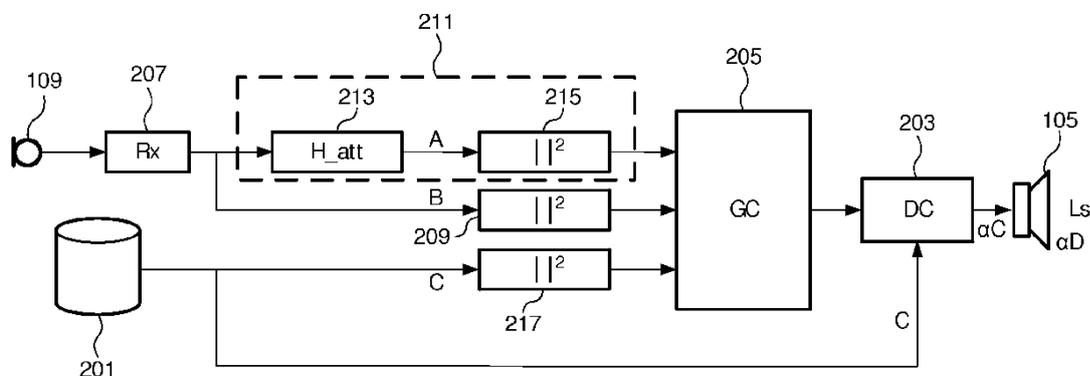
Definition statement

This place covers:

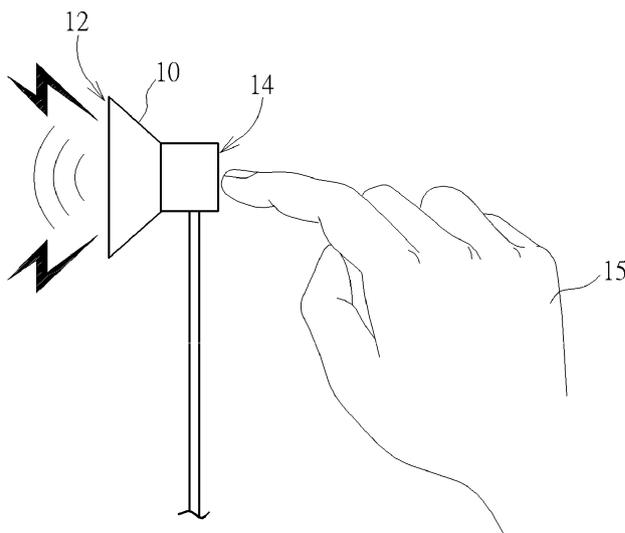
Electronic aspects of volume control, e.g. for control based on sensor signals or for limiting the maximum sound level, or aspects of elements used for volume control, e.g. for simplicity in use or the construction of control element.

The mere presence of a volume control should not be classified.

Example (electronic aspects of volume control): The volume level set by the gain controller (205) of a headphone is determined in dependence of the ambient signal (B) picked up by a microphone (109) and an attenuated version (A) thereof.



Example (aspects of the element used for control): The earphone 10 has a front side 12, from which sound is emitted from a speaker, and a back side 14 which the user can press with the user's finger or hand 15 in order to activate a switch that raises the volume level of the sound produced by the earphone 10.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|---|
| Control of amplification per se | H03G |
| Automatic control of amplifiers dependent upon ambient noise level or sound level | H03G 3/24 , H03G 3/32 |

H04R 2430/03

Synergistic effects of band splitting and sub-band processing

Definition statement

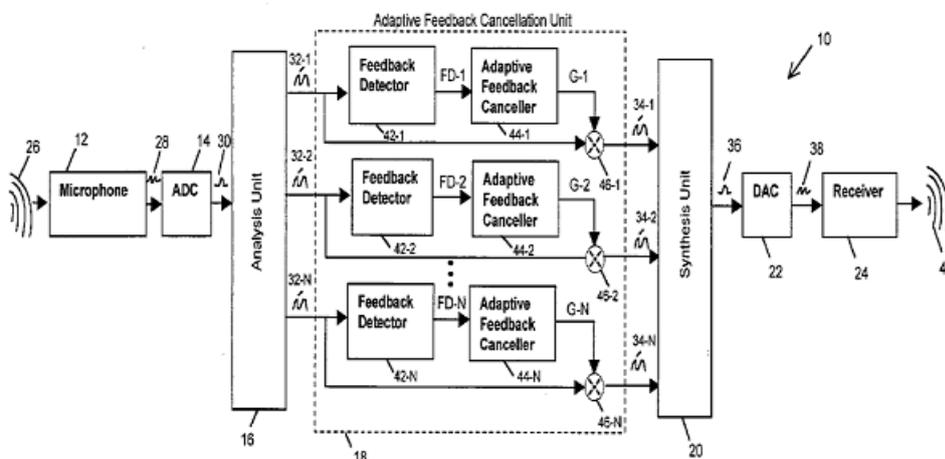
This place covers:

For example: EP1471765, US4953216, DE19632734.

Only if additional effects due to the combination of band splitting and sub-band processing are present (cf. the examples below).

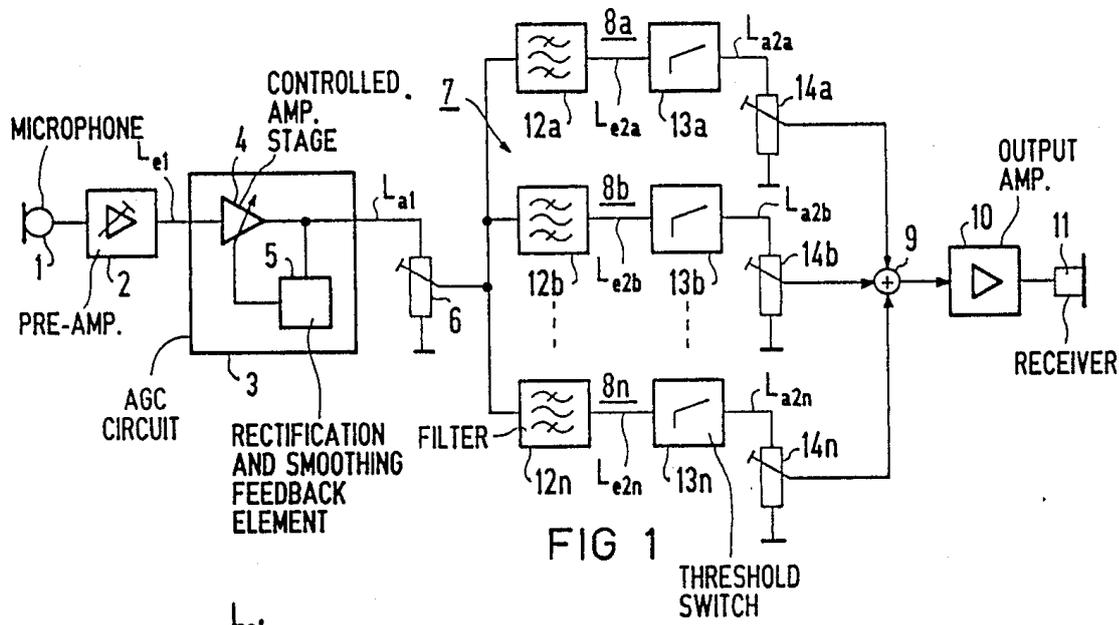
The mere fact that band splitting and sub-band processing is applied should not be classified.

For example: Adaptive feedback cancellation for individual frequency band, which reduces computational effort, thus making cancellation faster and a good sound quality can be maintained.



For example: For each frequency band (122a, 12b, ...) an automatic threshold switch (13a, 13b, ...) is opened if speech is present. Thus noise is only transmitted in the presence of louder speech in a frequency band and is suppressed if no speech is present in said band. Because the unwanted signals are transmitted only in those frequency channels wherein louder speech signals are

simultaneously present, the unwanted signals are always covered by the louder speech signals, and the unwanted signals are thus no longer audible.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|------------------------------------|------------------------------|
| Crossover filters for loudspeakers | H04R 3/14 |
| Digital filter banks | H03H 17/0266 |

Special rules of classification

The mere band splitting or presence of a filter bank (e.g. FFT or FIR) should not be classified.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------------------|--|
| Deaf aid | hearing aid, auditory prosthesis |
| Stereophonic system | two- or more channel system, e.g. quadraphonic, ambisonic or similar systems |

H04R 2430/20

Processing of the output signals of the acoustic transducers of an array for obtaining a desired directivity characteristic ([H04R 2203/12](#) takes precedence)

Definition statement

This place covers:

Signal processing of the output signals of an array of microphones for direction finding or of the input signals of an array of loudspeakers for steering sound in a desired direction

References

Limiting references

This place does not cover:

| | |
|---|------------------------------|
| Beamforming aspects for stereophonic sound reproduction with loudspeaker arrays | H04R 2203/12 |
|---|------------------------------|

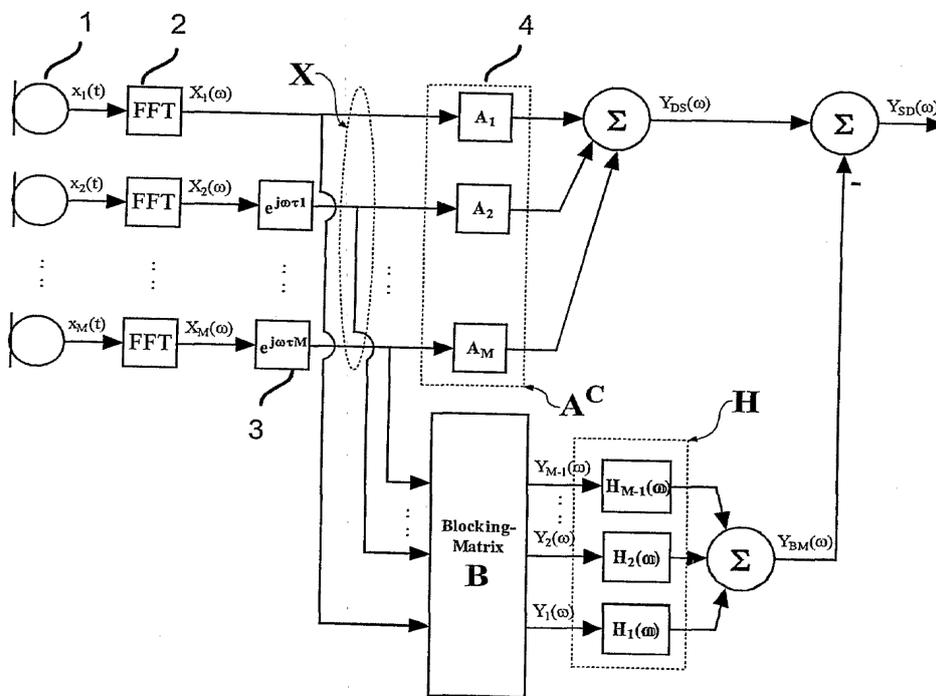
H04R 2430/25

Array processing for suppression of unwanted side-lobes in directivity characteristics, e.g. a blocking matrix

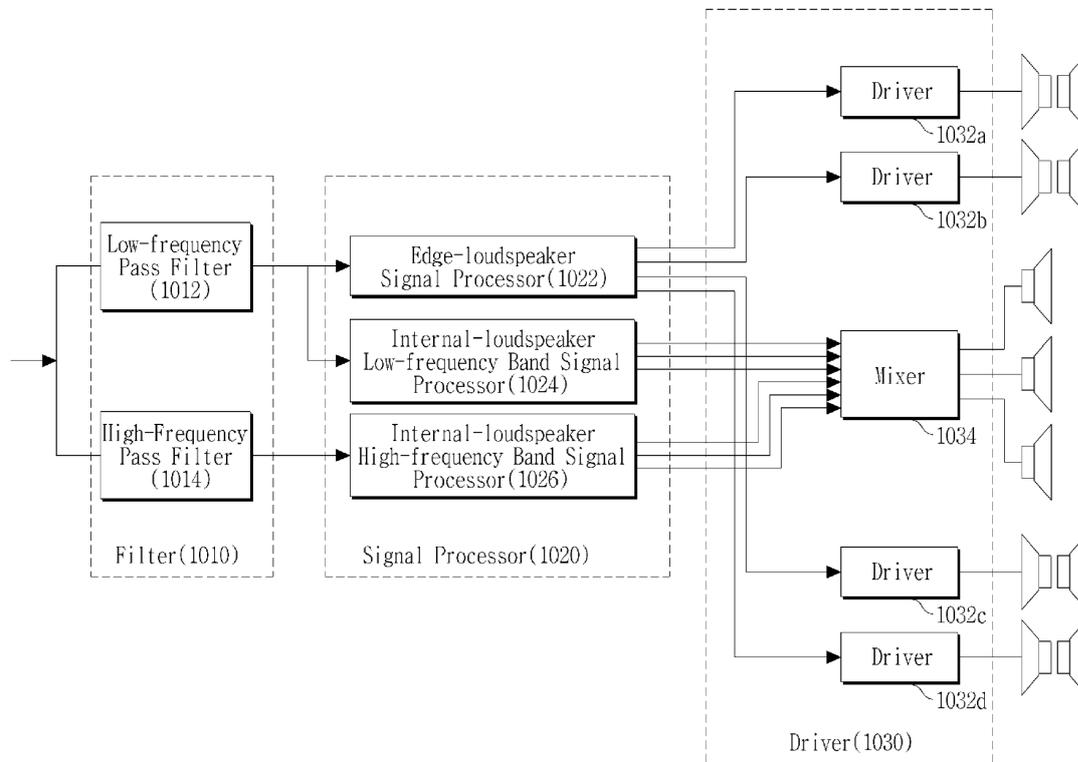
Definition statement

This place covers:

For example: microphone array



For example: loudspeaker array comprising additionally high-directivity edge loudspeakers which are driven with only low-frequency signal, to cancel side-lobes.



H04R 2440/01

Acoustic transducers using travelling bending waves to generate or detect sound

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|----------------------------|
| Plane diaphragms using the distributed mode principle | H04R 7/045 |
|---|----------------------------|

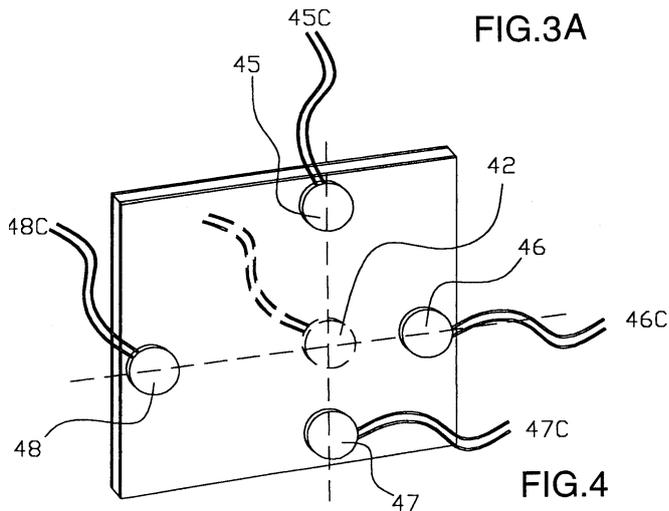
H04R 2440/05

Aspects relating to the positioning and way or means of mounting of exciters to resonant bending wave panels

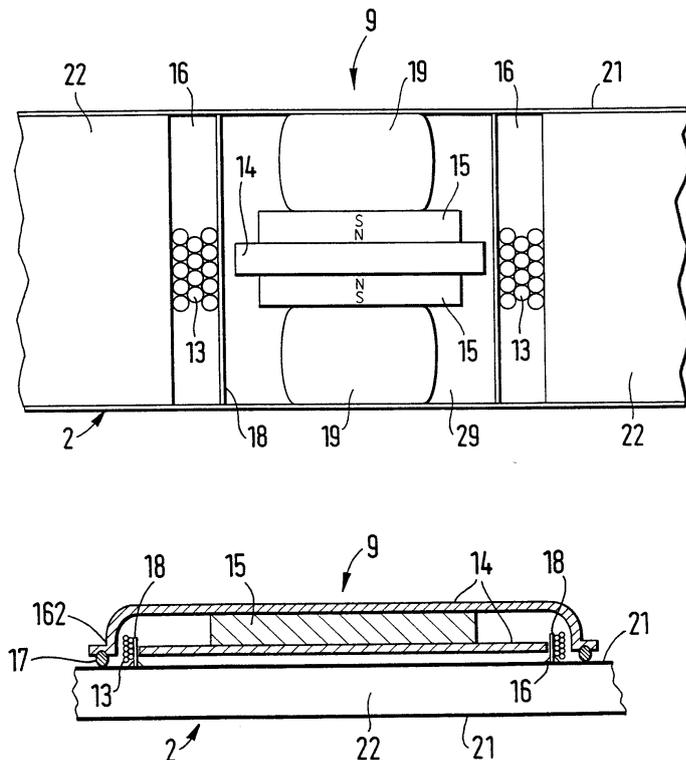
Definition statement

This place covers:

For example: Repositioning of central exciter (42) which has to be positioned at the edge of a transparent panel to be used for a visual display.



For example: mounting of the exciter (9) in the panel (2) (upper figure) or on the panel (2) (lower figure).



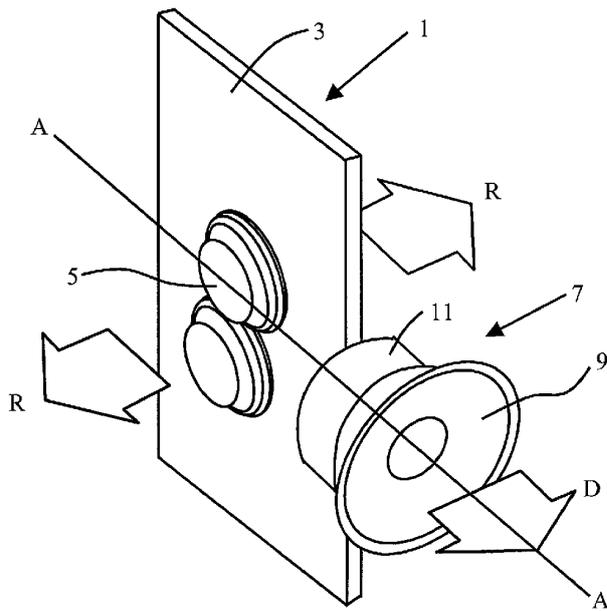
H04R 2440/07

Loudspeakers using bending wave resonance and pistonic motion to generate sound

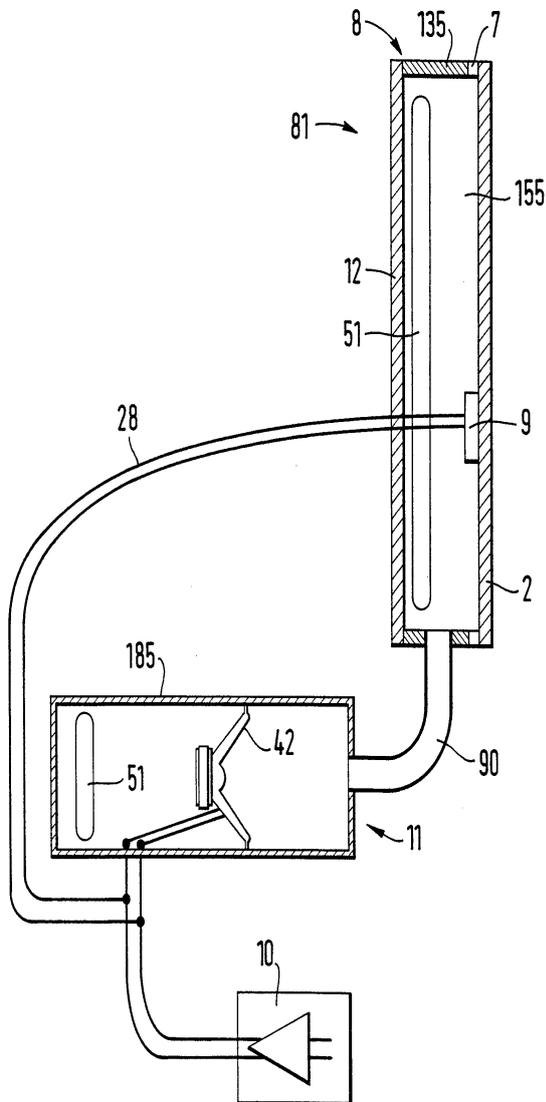
Definition statement

This place covers:

For example: Bending wave resonance speaker (1) for surround channels and pistonic loudspeaker transducer (7) for the main channel



For example: The membrane (2) of loudspeaker (81) is actively driven with resonant bending waves by an exciter (9) for the high frequencies and is passively driven by a pistonic loudspeaker transducer (42) for the low frequencies.



H04R 2460/01

Hearing devices using active noise cancellation

Definition statement

This place covers:

For example: US6661901 (earphone and hearing aid).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|--|
| Reduction of ambient noise in headphones in general | H04R 1/1083 |
| Ear defenders (electric or acoustic) | A61F 11/06 , A61F 11/14 , A61F 11/145 |

| | |
|--|--------------------------------|
| Active noise cancellation in general | G10K 11/175 |
| Active noise control in general for earphones or microphones | G10K 2210/1081 |

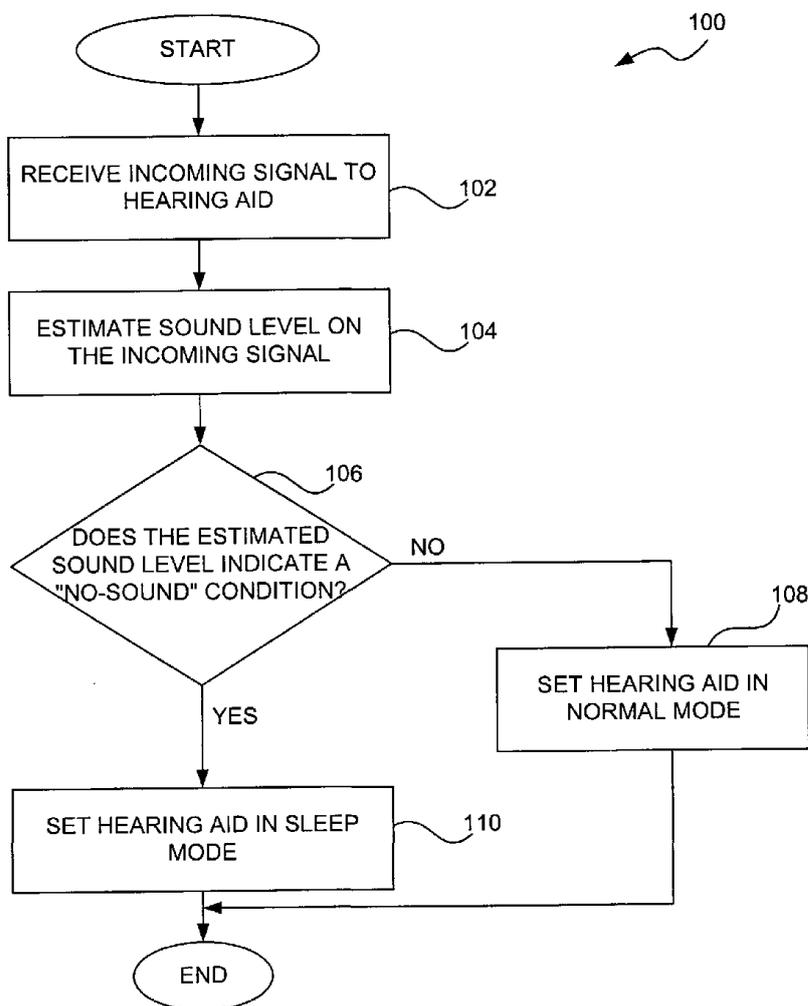
H04R 2460/03

Aspects of the reduction of energy consumption in hearing devices

Definition statement

This place covers:

For example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|---------------------------|
| Battery saving arrangements in cordless telephones | H04M 1/73 |
|--|---------------------------|

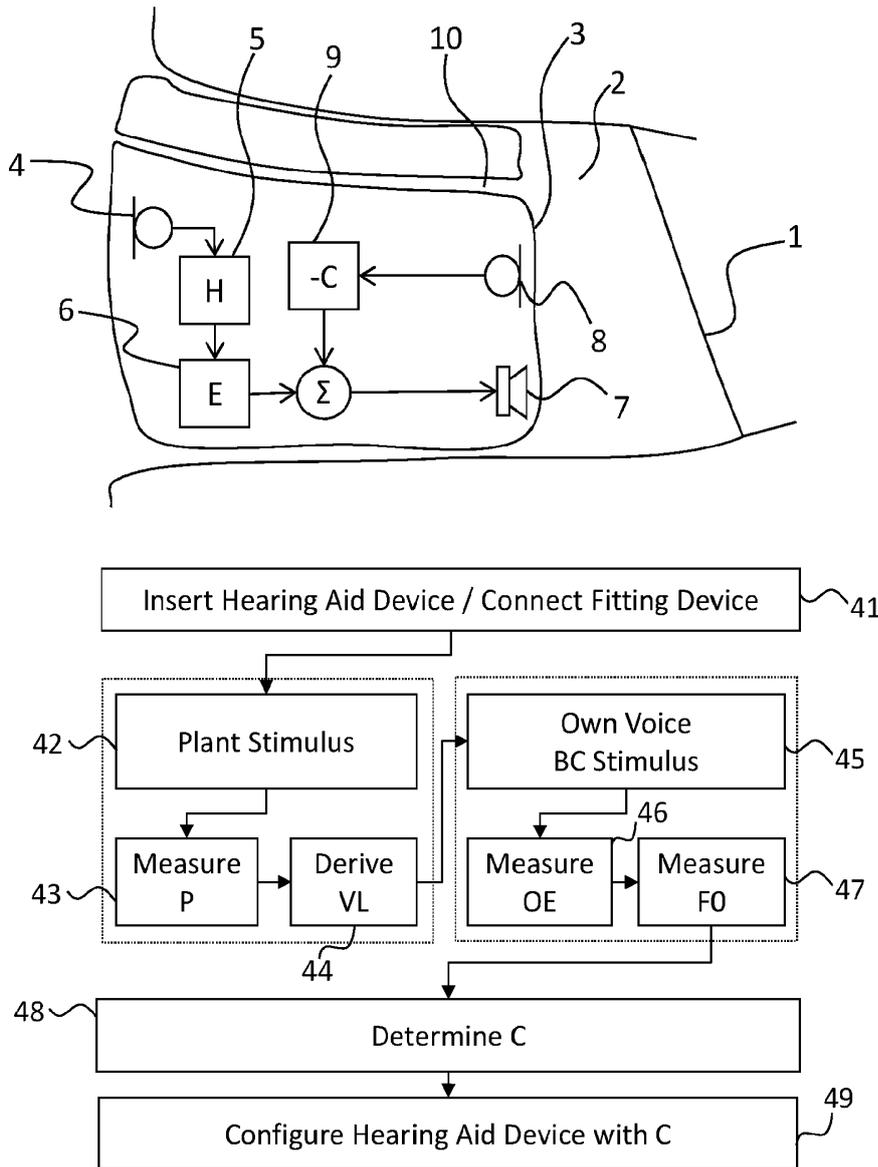
H04R 2460/05

Electronic compensation of the occlusion effect

Definition statement

This place covers:

For example: Fitting a hearing aid including occlusion compensation filter (C).



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Non-occlusive ear tips, i.e. leaving the ear canal open, for both custom and non-custom tips | H04R 2460/09 |
| Aspects relating to vents, e.g. shape, orientation, acoustic properties in ear tips of hearing aids to prevent occlusion | H04R 2460/11 |

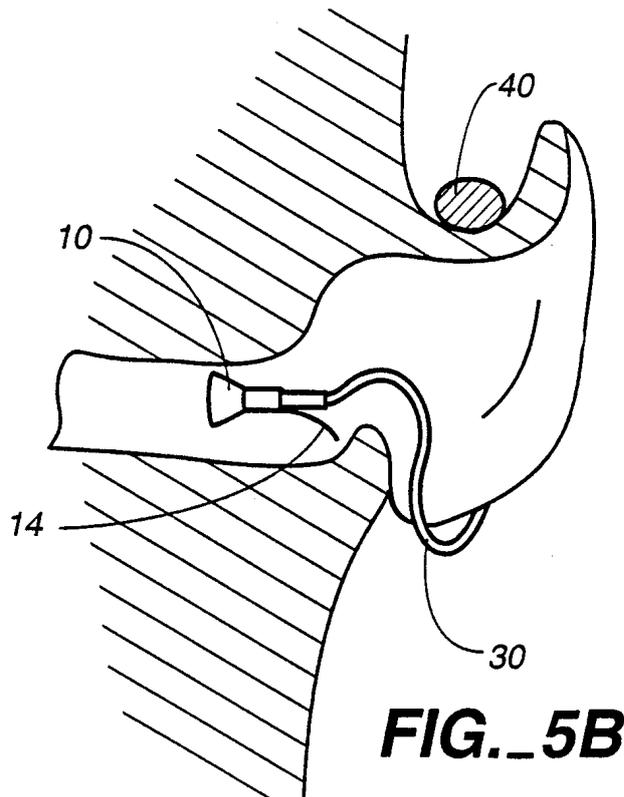
H04R 2460/09

Non-occlusive ear tips, i.e. leaving the ear canal open, for both custom and non-custom tips ([H04R 2460/11](#) takes precedence)

Definition statement

This place covers:

For example:

**References****Limiting references**

This place does not cover:

| | |
|--|------------------------------|
| Aspects relating to vents, e.g. shape, orientation, acoustic properties in ear tips of hearing aids to prevent occlusion | H04R 2460/11 |
|--|------------------------------|

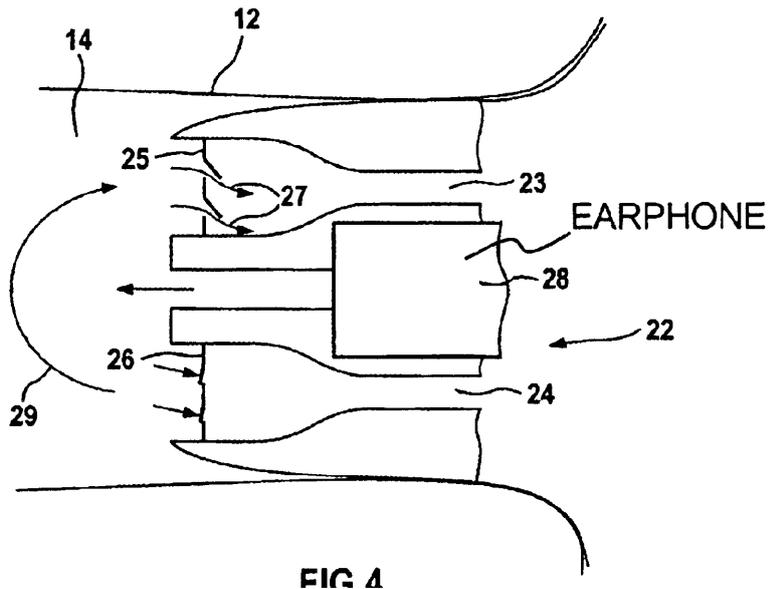
H04R 2460/11

Aspects relating to vents, e.g. shape, orientation, acoustic properties in ear tips of hearing devices to prevent occlusion

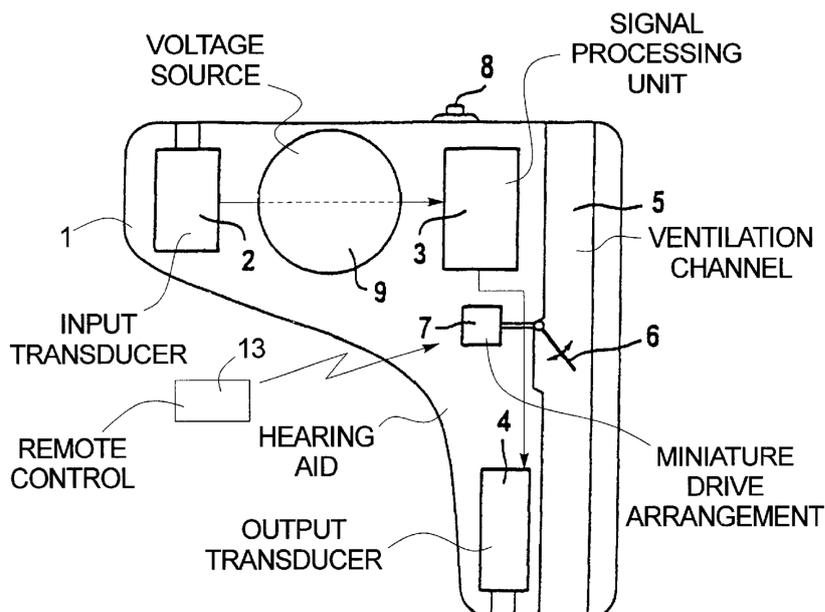
Definition statement

This place covers:

For example: Improved venting of the ear canal due to the opposite orientation of valves (25, 26), which enables circulation (29) of air in the ear canal.



For example: hearing aid device with a ventilation channel (5), cross-section of which can be adapted (6, 7) to the respective acoustic situation (e.g. acoustic feedback) in a fast and simple manner.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Prevention of acoustic feedback in hearing aids mechanically | H04R 25/456 |
| Electronic compensation of the occlusion effect | H04R 2460/05 |

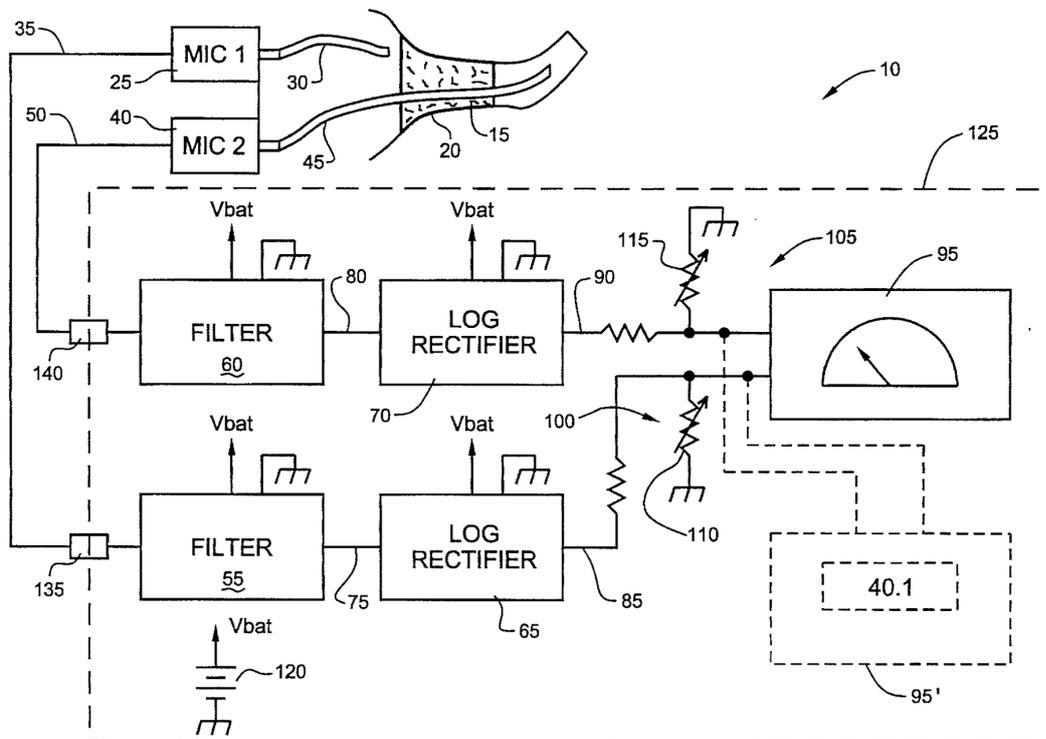
H04R 2460/15

Determination of the acoustic seal of ear moulds or ear tips of hearing devices

Definition statement

This place covers:

For example:



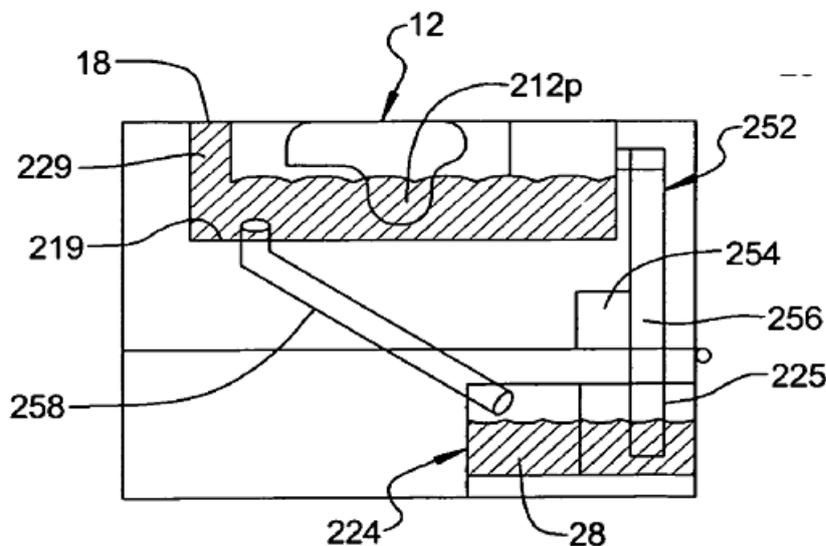
H04R 2460/17

Hearing device specific tools used for storing or handling hearing devices or parts thereof, e.g. placement in the ear, replacement of cerumen barriers, repair, cleaning hearing devices

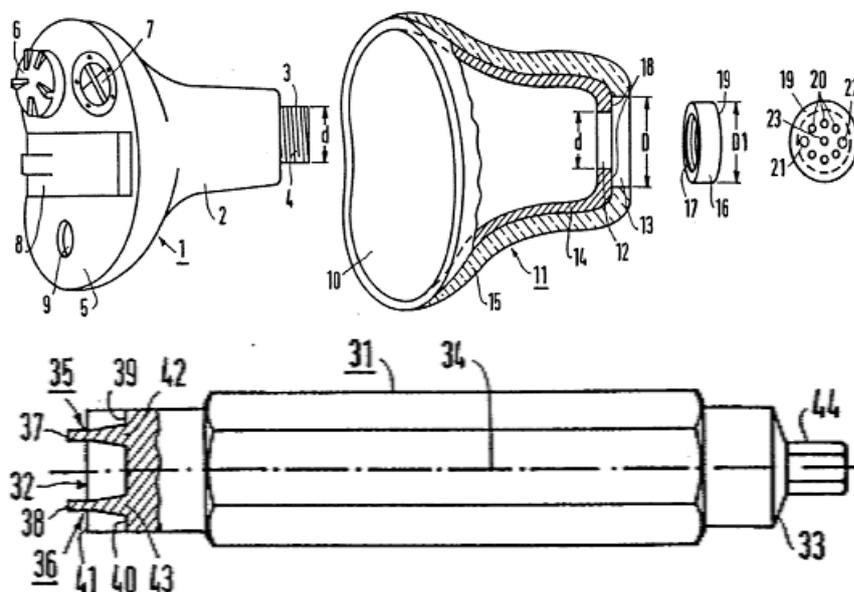
Definition statement

This place covers:

For example: Hearing aid (12) cleaning: a cleaning liquid (28) is pump up (with a pump system (252)) from a cartridge (224) into a reservoir (229) (cf. figure)

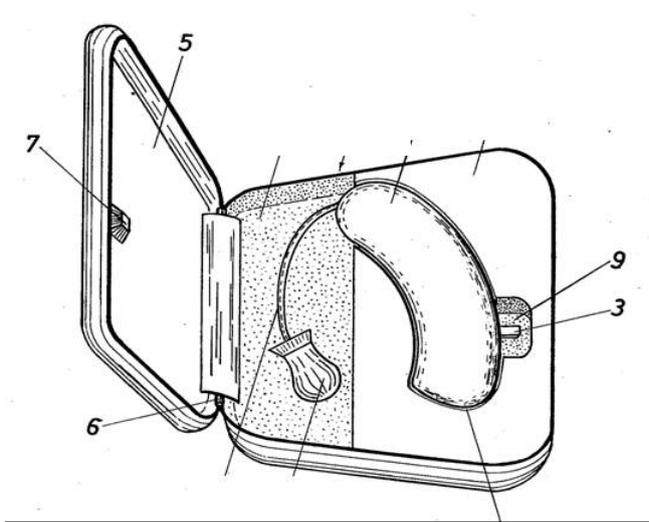


For example: Tool for replacement of cerumen barriers: a cerumen barrier (19) is provided with two holes (21, 22) (upper figure). The tool (lower figure) (31) is provided with two pins (35, 36) which fit in said holes (21, 22) of the cerumen barrier. Thus the barrier can be easily screwed onto the outside thread (4) of the neck (3) of the ITE hearing aid module (1).

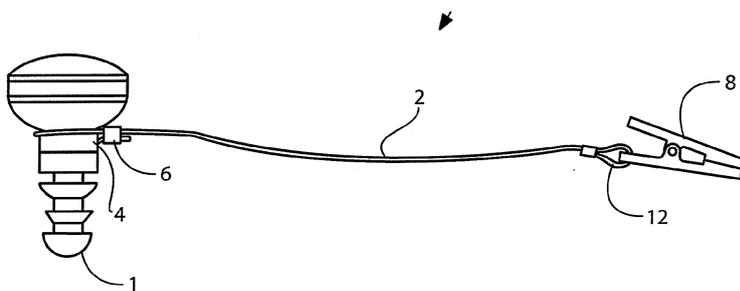


Definition statement

For example: hearing aid storage box: When the lid (5) is closed the protrusion (7) pushes the on/off switch (3) in the off position.



For example: safety loop for securing an earbud to e.g. a shirt.



H04R 2499/11

Transducers incorporated or for use in hand-held devices, e.g. mobile phones, PDA's, camera's

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|------------------------------|
| Mountings specially adapted for telephone equipment | H04M 1/02 |
| Improving the acoustic characteristics by means of constructional features of the housing (of telephone equipment), e.g. ribs, walls, resonating chambers or cavities | H04M 1/035 |
| Supports for telephone transmitters and receivers | H04M 1/04 |
| Substation equipment with increased functionality, e.g. for playing back music files | H04M 1/72442 |

H04R 2499/13

Acoustic transducers and sound field adaptation in vehicles

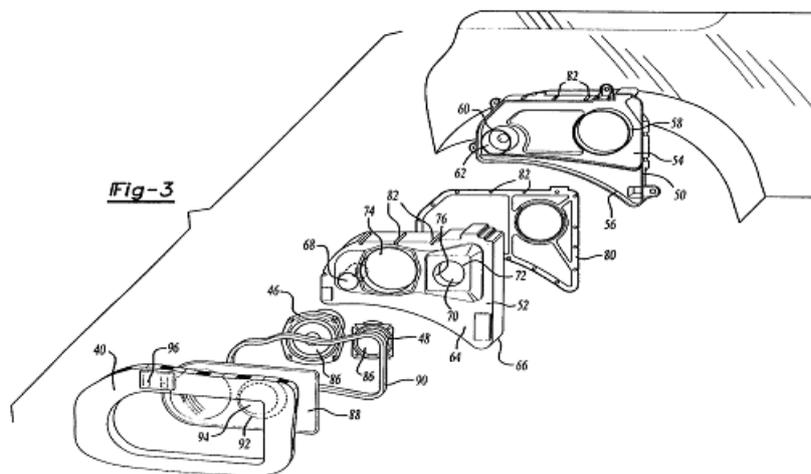
Definition statement

This place covers:

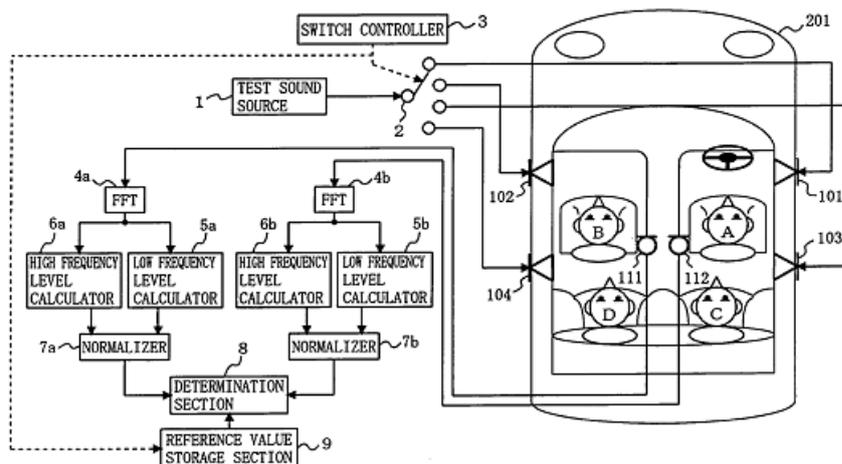
For example: US6389147, EP1482763.

Subject matter relating to mounting of transducers on or within a vehicle, e.g. automobile, aircraft, motorcycle, and to electronic control of the sound field within a vehicle, e.g. automobile, aircraft, motorcycle.

For example: Mounting of transducers in vehicles



For example: Sound control in vehicles



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|--|------------------------------|
| Mounting of acoustic transducers in vehicles | B60R 11/0217 |
|--|------------------------------|

| | |
|---|---|
| Automatic control of amplifiers dependent upon ambient noise level or sound level | H03G 3/24 , H03G 3/32 |
|---|---|

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|----------------------|--|
| Stereophonic system | two- or more channel system, e.g. quadraphonic, ambisonic or similar systems |
| Multi-channel system | three- or more channel system |

H04R 2499/15

Transducers incorporated in visual displaying devices, e.g. televisions, computer displays, laptops

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| | |
|---|-----------------------------|
| Details related to the integrated loudspeakers in data processing equipment | G06F 1/1605 |
| Loudspeakers in televisions | H04N 5/642 |