COOPERATIVE PATENT CLASSIFICATION

ELECTRICITY

ELECTRIC COMMUNICATION TECHNIQUE

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)

NOTE

This subclass 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 or arrangements]

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

Details of transducers, [loudspeakers or microphones]

1/00

1/005 . [using digitally weighted transducing elements]

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 1/075])

1/021 . [incorporating only one transducer]

1/023 . [Screens for loudspeakers]

1/025 . [Arrangements for fixing loudspeaker transducers, e.g. in a box, furniture]

1/026 . [Supports for loudspeaker casings]

1/028 . [associated with devices performing functions other than acoustics, e.g. electric candles]

1/04 . [Structural association of microphone with electric circuitry therefor (in deaf-aid sets H04R 25/00)]

1/06 . Arranging circuit leads; Relieving strain on circuit leads

1/08 . Mouthpieces; [Microphones;;] Attachments therefor

1/083 . [Special constructions of mouthpieces]

1/086 . [Protective screens, e.g. all weather or wind screens]

1/10 . Earpieces; Attachments therefor [:; Earphones; Monophonic headphones (H04R 1/28 takes precedence; stereophonic headphones H04R 5/033)]

NOTES

1. This group covers details of headphones, both of monophonic and stereophonic type.
2. When classifying in this group or in its subgroups, aspects relating to stereophonic headphones are to be classified in H04R 5/033 as well

1/1008 . [Earpieces of the supra-aural or circum-aural type]

1/1016 . [Earpieces of the intra-aural type]

1/1025 . [Accumulators or arrangements for charging (secondary cells per se H01M 10/00; charging in general H02J 7/00)]

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)]

1/1041 . [Mechanical or electronic switches, or control elements (switches in general H01H)]

1/105 . [Earpiece supports, e.g. ear hooks (for stereophonic headphones H04R 5/0335)]

1/1058 . [Manufacture or assembly]

1/1066 . [Constructional aspects of the interconnection between earpiece and earpiece support (earpiece support for monophonic headphones H04R 1/105; earpiece support for stereophonic headphones H04R 5/0335)]

1/1075 . [Mountings of transducers in earphones or headphones]

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

for obtaining desired frequency characteristic only (circuit for combining transducers having different responses H04R 3/00) (for hearing aids H04R 25/40(1))

{for microphones (H04R 1/24, H04R 1/26 take precedence)}

{for telephonic receivers}
{using transducers reproducing the same frequency band}

Structural combinations of separate transducers or of two parts of the same transducer and responsive respectively to two or more frequency ranges

{of microphones}

Spatial arrangements of separate transducers responsive to two or more frequency ranges

{of microphones}

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))

{for loudspeaker transducers}

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

{for loudspeaker transducers}
{of the bass reflex type}
{for loudspeaker transducers}
{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)}

{for loudspeaker transducers}
{using a passive diaphragm}
{for loudspeaker transducers}
{of the bandpass type}
{for loudspeaker transducers}
{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)}

{for loudspeaker transducers}
{using an acoustic labyrinth or a transmission line}
{for loudspeaker transducers}
{using a back-loaded horn}
{for loudspeaker transducers}

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

{for loudspeaker transducers}
{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)}

{for loudspeaker transducers}
{by means of the enclosure structure, i.e. strengthening or shape of the enclosure (by means of Helmholtz resonators H04R 1/2869)}

{for loudspeaker transducers}
{Mountings or supports for transducers}
{for loudspeaker transducers}

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 1/3451)]

for obtaining desired directional characteristic only (specially adapted for hearing aids H04R 25/40)

{for loudspeakers (H04R 1/34 and H04R 1/40 take precedence)}
{for microphones (H04R 1/34 and H04R 1/40 take precedence)}

by using a single transducer with sound reflecting, diffracting, directing or guiding means (specially adapted for hearing aids H04R 25/40(2))

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

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

in which sound waves act upon both sides of a diaphragm and incorporating acoustic phase-shifting means, e.g. pressure-gradient microphone

by combining a number of identical transducers (specially adapted for hearing aids H04R 25/40(3))

{loud-speakers}
{microphones}

, Combinations of transducers with fluid-pressure or other non-electrical amplifying means

Special adaptations for subaqueous use, e.g. for hydrophone

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

Circuits for transducers [, loudspeakers or microphones]

(Damping circuit arrangements for transducers, e.g. motional feedback circuits)
5/00 Stereophonic arrangements (stereophonic pick-ups H04R 9/16, H04R 11/12, H04R 17/08, H04R 19/10)

NOTE
In this group, the expression "stereophonic arrangements" covers quadraphonic or similar arrangements.

5/02 . Spatial or constructional arrangements of loudspeakers
5/03 . [in a chair, pillow]
5/07 . Spatial or constructional arrangements of microphones, e.g. in dummy heads
5/033 . Headphones for stereophonic communication
{details thereof, e.g. relating to batteries, cables or control elements H04R 1/10}
5/0335 . [Earpiece support, e.g. headbands or neckrests
(for monophonic headphones H04R 1/105)]
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)

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})
7/02 . characterised by the construction
7/04 . Plane diaphragms
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 pithonic motion}
7/06 . . . comprising a plurality of sections or layers
7/08 . . . . comprising superposed layers separated by air or other fluid
7/10 . . . . comprising superposed layers in contact
7/12 . . . Non-planar diaphragms or cones
7/122 . . . {comprising a plurality of sections or layers}
7/125 . . . . {comprising a plurality of superposed layers in contact}
7/127 . . . {dome-shaped}
7/14 . . . corrugated, pleated or ribbed
7/16 . Mounting or tensioning of diaphragms or cones
7/18 . . . at the periphery
7/20 . . . Securing diaphragm or cone resiliently to support by flexible material, springs, cords, or strands
7/22 . . . Clamping rim of diaphragm or cone against seating
7/24 . . . Tensioning by means acting directly on free portions of diaphragm or cone
7/26 . Damping by means acting directly on free portion of diaphragm or cone (air damping H04R 1/28)

9/00 Transducers of moving-coil, moving-strip, or moving-wire type
9/02 . Details
9/022 . . . {Cooling arrangements}
9/025 . . . {Magnetic circuit}
9/027 . . . {Air gaps using a magnetic fluid}
9/04 . . . Construction, mounting, or centering of coil
9/041 . . . {Centering}
9/042 . . . . {by pressurised air}
9/043 . . . . {Inner suspension or damper, e.g. spider (outer suspension or surround H04R 7/16)}
9/045 . . . . {Mounting (H04R 9/043 takes precedence)}
9/046 . . . . . {Construction}
9/047 . . . . . . {in which the windings of the moving coil lay in the same plane}
9/048 . . . . . . . {of the ribbon type}
9/06 . Loudspeakers
9/063 . . . . . {using a plurality of acoustic drivers (H04R 1/24 and H04R 1/403 take precedence)}
9/066 . . . . . {using the principle of inertia}
9/08 . Microphones
9/10 . Telephone receivers
9/12 . Gramophone pick-ups using a stylus; Recorders using a stylus
9/14 . . . comprising two or more styli or transducers (H04R 9/16 takes precedence)
9/16 . . . signals recorded or played back by vibration of a stylus in two orthogonal directions simultaneously
9/18 . . . Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency

11/00 Transducers of moving-armature or moving-core type (acoustic diaphragm of magnetisable material directly coacting with electromagnet H04R 13/00)
11/02 . Loudspeakers
11/04 . Microphones
11/06 . Telephone receivers
11/08 . Gramophone pick-ups using a stylus; Recorders using a stylus
11/10 . . . comprising two or more styli or transducers (H04R 11/12 takes precedence)
11/12 . . . signals being recorded or played back by vibration of a stylus in two orthogonal directions simultaneously
11/14 . . . Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency

13/00 Transducers having an acoustic diaphragm of magnetisable material directly co-acting with electromagnet
13/02 . Telephone receivers
15/00 Magnetostrictive transducers (magnetostrictive elements in general H01L 41/00)
17/00 Piezoelectric transducers; Electrostrictive transducers (piezoelectric or electrostrictive elements in general H01L 41/00; details of piezoelectric or electrostrictive motors, generators or positioners (H01L 41/00))

17/005 [using a piezoelectric polymer]
17/02 Microphones
17/025 [using a piezoelectric polymer]
17/04 Gramophone pick-ups using a stylus; Recorders using a stylus
17/06 [comprising two or more styli or transducers (H04R 17/08 takes precedence)]
17/08 [signals being recorded or played back by vibration of a stylus in two orthogonal directions simultaneously]
17/10 Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency

19/00 Electrostatic transducers
19/005 [using semiconductor materials]
19/01 characterised by the use of electrets
19/013 [for loudspeakers]
19/016 [for microphones]
19/02 Loudspeakers (H04R 19/01 takes precedence)
19/04 Microphones (H04R 19/01 takes precedence)
19/06 Gramophone pick-ups using a stylus; Recorders using a stylus [for loudspeakers (H04R 19/01 takes precedence)]
19/08 [comprising two or more styli or transducers (H04R 19/10 takes precedence)]
19/10 [signals being recorded or played back by vibration of a stylus in two orthogonal directions simultaneously]

21/00 Variable-resistance transducers (gaseous resistance transducers H04R 23/00; magneto-resistive transducers H04R 23/00)
21/02 Microphones
21/021 [with granular resistance material]
21/023 [with more than one granular chamber]
21/025 [disposition of the granular chamber in microphones]
21/026 [in which the sound is perpendicular to the current crossing the transducer material]
21/028 [with a fluid as resistance material]
21/04 Gramophone pick-ups using a stylus; Recorders using a stylus

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)
23/002 [using electrothermic-effect transducer]
23/004 [using ionised gas]
23/006 [using solid state devices (solid state devices per se H01L)]
23/008 [using optical signals for detecting or generating sound]
23/02 Transducers using more than one principle simultaneously

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)]

NOTE Classification should be directed to groups H04R 25/02, H04R 25/04 or H04R 25/50 and its subgroups, if and only if the technical subject in consideration cannot be classified elsewhere under the main group H04R 25/00

25/02 adapted to be supported entirely by ear
25/04 comprising pocket amplifiers
25/30 [Monitoring or testing of hearing aids, e.g. functioning, settings, battery power]
25/305 [Self-monitoring or self-testing]
25/35 [using translation techniques]
25/353 [Frequency, e.g. frequency shift or compression]
25/356 [Amplitude, e.g. amplitude shift or compression]
25/40 [Arrangements for obtaining a desired directivity characteristic]
25/402 [using constructional means]
25/405 [by combining a plurality of transducers]
25/407 [Circuits for combining signals of a plurality of transducers]
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)]
25/45 [Prevention of acoustic reaction, i.e. acoustic oscillatory feedback]
25/453 [electronically]
25/456 [mechanically]
25/48 [using constructional means for obtaining a desired frequency response (H04R 25/652 takes precedence)]
25/50 [Customised settings for obtaining desired overall acoustical characteristics]
25/502 [using analog signal processing]
25/505 [using digital signal processing]
25/507 [implemented by neural network or fuzzy logic]
25/55 [using an external connection, either wireless or wired]
25/552 [Binaural]
25/554 [using a wireless connection, e.g. between microphone and amplifier or using Tcoils]
25/556 [External connectors, e.g. plugs or modules (H04R 25/607 takes precedence)]

WARNING Group H04R 25/556 is impacted by reclassification into group H04R 25/607.
Groups H04R 25/556 and H04R 25/607 should be considered in order to perform a complete search.
25/558 [Remote control, e.g. of amplification, frequency]
25/60 . {Mounting or interconnection of hearing aid parts, e.g. inside tips, housings or to osicles (ear wax retarders, e.g. mounting thereof H04R 25/654)}

**WARNING**

Group H04R 25/60 is impacted by reclassification into groups H04R 25/603, H04R 25/607, H04R 25/609, and H04R 2225/57.

All groups listed in this Warning should be considered in order to perform a complete search.

25/602 . . {of batteries}
25/603 . . {of mechanical or electronic switches or control elements}

**WARNING**

Group H04R 25/603 is incomplete pending reclassification of documents from groups H04R 25/60 and H04R 2225/61.

Groups H04R 25/60, H04R 2225/61, and H04R 25/603 should be considered in order to perform a complete search.

25/604 . . {of acoustic or vibrational transducers}
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}
25/607 . . {of earhooks}

**WARNING**

Group H04R 25/607 is incomplete pending reclassification of documents from groups H04R 25/556, H04R 25/60, and H04R 2225/021.

All groups listed in this Warning should be considered in order to perform a complete search.

25/609 . . {of circuity (of electronic switches or control elements H04R 25/603)}

**WARNING**

Group H04R 25/609 is incomplete pending reclassification of documents from group H04R 25/60.

Groups H04R 25/60 and H04R 25/609 should be considered in order to perform a complete search.

25/65 . {Housing parts, e.g. shells, tips or moulds, or their manufacture}

**NOTE**

Housing parts for mechanical mounting or interconnection of hearing aid parts covered by H04R 25/60 are to be classified in H04R 25/60

25/652 . . {Ear tips; Ear moulds (hybrid ear moulds or post-processing thereof for their customisation H04R 25/659)}

**WARNING**

Group H04R 25/652 is impacted by reclassification into group H04R 25/659.

Groups H04R 25/652 and H04R 25/659 should be considered in order to perform a complete search.

25/654 . . . {Ear wax retarders}
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}
25/658 . . . {Manufacture of housing parts}
25/659 . . . {Post-processing of hybrid ear moulds for customisation, e.g. in-situ curing}

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 H04R 30/3)

27/02 . Amplifying systems for the deaf
27/04 . Electric megaphones

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}

29/001 . . {For loudspeakers (H04R 29/007 takes precedence)}
29/002 . . . {Loudspeaker arrays}
29/003 . . . {of the moving-coil type}
29/004 . . {for microphones (H04R 29/007 takes precedence)}
29/005 . . . {Microphone arrays}
29/006 . . . {Microphone matching}
29/007 . . {for public address systems (public address systems per se H04R 27/00)}
29/008 . . . {Visual indication of individual signal levels (visual indication of stereophonic sound image H04S 7/40)}

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 1/001823}

31/003 . . {for diaphragms or their outer suspension}
31/006 . . {Interconnection of transducer parts (of diaphragm and outer suspension by moulding H04R 31/003)}
Details of transducers, loudspeakers or microphones covered by H04R 1/00 but not provided for in any of its subgroups

- Mems transducers or their use (of the electrostatic type H04R 19/00)

Details of casings, cabinets or mounting therein for transducers covered by H04R 1/02 but not provided for in any of its subgroups

- Transducers or their casings adapted for mounting in or to a wall or ceiling
- Transducers incorporated in garment, rucksacks or the like
- Transducer mountings or cabinet supports enabling variable orientation of transducer of cabinet

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)

Manufacturing aspects of enclosures transducers

- Combination of monophonic or stereophonic headphones with audio players, e.g. integrated in the headphone
- Manufacture of mono- or stereophonic headphone components
- Monophonic and stereophonic headphones with microphone for two-way hands free communication
- Arrangements to adapt hands free headphones for use on both ears

- Directing or guiding sound by means of a phase plug
- Details of arrangements for obtaining desired directional characteristic by combining a number of identical transducers covered by H04R 1/40 but not provided for in any of its subgroups

- 2D or 3D arrays of transducers
- Linear arrays of transducers
- Non-uniform arrays of transducers or a plurality of uniform arrays with different transducer spacing

Details of circuits for transducers, loudspeakers or microphones covered by H04R 3/00 but not provided for in any of its subgroups

- Beamforming aspects for stereophonic sound reproduction with loudspeaker arrays

Details of stereophonic arrangements covered by H04R 5/00 but not provided for in any of its subgroups

- 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
- Plurality of transducers corresponding to a plurality of sound channels in each earpiece of headphones or in a single enclosure
BTE hearing aids having a receiver in the ear mould

**WARNING**

Group H04R 2225/0216 is incomplete pending reclassification of documents from group H04R 2225/021.

Groups H04R 2225/021 and H04R 2225/0216 should be considered in order to perform a complete search.

- 2225/23: Completely in the canal [CIC] hearing aids
- 2225/25: In the ear hearing aids [ITE] hearing aids
- 2225/31: Aspects of the use of accumulators in hearing aids, e.g. rechargeable batteries or fuel cells
- 2225/33: Aspects relating to adaptation of the battery voltage, e.g. its regulation, increase or decrease
- 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
- 2225/44: Detection or adaptation of hearing aid parameters or programs to listening situation, e.g. pub, forest
- 2225/43: Signal processing in hearing aids to enhance the speech intelligibility
- 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
- 2225/51: Aspects of antennas or their circuitry in or for hearing aids
- 2225/53: Hearing aid for unilateral hearing impairment using Contralateral Routing Of Signals [CROS]
- 2225/55: Communication between hearing aids and external devices via a network for data exchange
- 2225/57: Aspects of electrical interconnection between hearing aid parts

**WARNING**

Group H04R 2225/57 is incomplete pending reclassification of documents from group H04R 25/60.

Groups H04R 25/60 and H04R 2225/57 should be considered in order to perform a complete search.

- 2225/59: Arrangements for selective connection between one or more amplifiers and one or more receivers within one hearing aid
- 2225/61: Aspects relating to mechanical or electronic switches or control elements, e.g. functioning

**WARNING**

Group H04R 2225/61 is impacted by reclassification into group H04R 25/603.

Groups H04R 2225/61 and H04R 25/603 should be considered in order to perform a complete search.

- 2225/67: Implantable hearing aids or parts thereof not covered by H04R 25/606
- 2225/77: Design aspects, e.g. CAD, of hearing aid tips, moulds or housings

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

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

Details of public address [PA] systems covered by H04R 27/00 but not provided for in any of its subgroups

- 2227/001: Adaptation of signal processing in PA systems in dependence of presence of noise
- 2227/003: Digital PA systems using, e.g. LAN or internet
- 2227/005: Audio distribution systems for home, i.e. multi-room use
- 2227/007: Electronic adaptation of audio signals to reverberation of the listening space for PA
- 2227/009: Signal processing in [PA] systems to enhance the speech intelligibility

Details of apparatus or processes specially adapted for the manufacture of transducers or diaphragms therefor covered by H04R 31/00, not provided for in its subgroups

- 2231/001: Moulding aspects of diaphragm or surround
- 2231/003: Manufacturing aspects of the outer suspension of loudspeaker or microphone diaphragms or of their connecting aspects to said diaphragms

Details of diaphragms or cones for electromechanical transducers, their suspension or their manufacture covered by H04R 7/00 or H04R 31/003, not provided for in any of its subgroups

- 2307/021: Diaphragms comprising cellulose-like materials, e.g. wood, paper, linen
- 2307/023: Diaphragms comprising ceramic-like materials, e.g. pure ceramic, glass, boride, nitride, carbide, mica and carbon materials
- 2307/025: Diaphragms comprising polymeric materials
- 2307/027: Diaphragms comprising metallic materials
- 2307/029: Diaphragms comprising fibres
- 2307/201: Damping aspects of the outer suspension of loudspeaker diaphragms by addition of additional damping means
- 2307/204: Material aspects of the outer suspension of loudspeaker diaphragms
- 2307/207: Shape aspects of the outer suspension of loudspeaker diaphragms

**Loudspeakers**

**NOTE**

H04R 2400/00 itself is only to be used 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 circuits for microphones or for loudspeakers

- 2400/01: Transducers used as a loudspeaker to generate sound as well as a microphone to detect sound
- 2400/03: Transducers capable of generating both sound as well as tactile vibration, e.g. as used in cellular phones
2400/07 Suspension between moving magnetic core and housing
2400/11 Aspects regarding the frame of loudspeaker transducers
2400/13 Use or details of compression drivers

2410/00 Microphones

**NOTE**

H04R 2410/00 itself is only to be used 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 circuits for microphones or for loudspeakers

2410/01 Noise reduction using microphones having different directional characteristics
2410/03 Reduction of intrinsic noise in microphones
2410/05 Noise reduction with a separate noise microphone
2410/07 Mechanical or electrical reduction of wind noise generated by wind passing a microphone

2420/00 Details of connection covered by H04R, not provided for in its groups
2420/01 Input selection or mixing for amplifiers or loudspeakers (for hearing aids H04R 25/43)
2420/03 Connection circuits to selectively connect loudspeakers or headphones to amplifiers
2420/05 Detection of connection of loudspeakers or headphones to amplifiers
2420/07 Applications of wireless loudspeakers or wireless microphones
2420/09 Applications of special connectors, e.g. USB, XLR, in loudspeakers, microphones or headphones

2430/00 Signal processing covered by H04R, not provided for in its groups
2430/01 Aspects of volume control, not necessarily automatic, in sound systems
2430/03 Synergistic effects of band splitting and sub-band processing
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)

2430/21 Direction finding using differential microphone array [DMA]
2430/23 Direction finding using a sum-delayout beam-former
2430/25 Array processing for suppression of unwanted side-lobes in directivity characteristics, e.g. a blocking matrix

2440/00 Bending wave transducers covered by H04R, not provided for in its groups
2440/01 Acoustic transducers using travelling bending waves to generate or detect sound
2440/03 Resonant bending wave transducer used as a microphone
2440/05 Aspects relating to the positioning and way or means of mounting of exciters to resonant bending wave panels
2440/07 Loudspeakers using bending wave resonance and pistonic motion to generate sound

2460/00 Details of hearing devices, i.e. of ear- or headphones covered by H04R 1/10 or H04R 5/033 but not provided for in any of their subgroups, or of hearing aids covered by H04R 25/00 but not provided for in any of its subgroups
2460/01 Hearing devices using active noise cancellation
2460/03 Aspects of the reduction of energy consumption in hearing devices
2460/05 Electronic compensation of the occlusion effect
2460/07 Use of position data from wide-area or local-area positioning systems in hearing devices, e.g. program or information selection
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)

2460/11 Aspects relating to vents, e.g. shape, orientation, acoustic properties in ear tips of hearing devices to prevent occlusion
2460/13 Hearing devices using bone conduction transducers
2460/15 Determination of the acoustic seal of ear moulds or ear tips of hearing devices
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

2499/00 Aspects covered by H04R or H04S not otherwise provided for in their subgroups
2499/01 General technical reviews, overviews, tutorials
2499/10 General applications
2499/11 Transducers incorporated or for use in hand-held devices, e.g. mobile phones, PDA's, camera's
2499/13 Acoustic transducers and sound field adaptation in vehicles
2499/15 Transducers incorporated in visual displaying devices, e.g. televisions, computer displays, laptops