

CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS (NOTES omitted)

INSTRUMENTS

G10 MUSICAL INSTRUMENTS; ACOUSTICS (NOTES omitted)

G10K SOUND-PRODUCING DEVICES; METHODS OR DEVICES FOR PROTECTING AGAINST, OR FOR DAMPING, NOISE OR OTHER ACOUSTIC WAVES IN GENERAL; ACOUSTICS NOT OTHERWISE PROVIDED FOR

NOTES

- This subclass covers:
 - arrangements for generating mechanical vibrations in fluids;
 - the production of sounds which may not be audible to human beings but which are audible to animals.
- In this subclass, the following terms are used with the meanings indicated:
 - "acoustics" and "sound" cover the technical field dealing with mechanical vibrations at all infrasonic -, sonic - and ultrasonic frequencies. However, generation or transmission of mechanical waves, in general, is covered by subclass [B06B](#), subject to the exception specified in Note (1) above.

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.}

1/00	Devices in which sound is produced by striking a resonating body, e.g. bells, chimes or gongs (multi-toned musical instruments G10D 13/08; automatic carillons G10F 1/10)	1/345	. . . . . {electrically operated}
		1/347	. . . . . {for an oscillating bell which is driven twice per cycle}
1/06	. the resonating devices having the shape of a bell, plate, rod, or tube (bells for towers G10K 1/28)	1/348	. . . . . {electrically operated}
1/062	. . electrically operated	1/36	. . . Means for silencing or damping
1/063	. . . the sounding member being a bell	1/38	. . . Supports; Mountings
1/064	. . . . Operating or striking mechanisms therefor	3/00	Rattles or like noise-producing devices {, e.g. door-knockers}
1/0645	. . . . . {provided with loudness adjustment}	5/00	Whistles
1/065	. . . . . for timed or repeated operation	5/02	. Ultrasonic whistles
1/066	. . . the sounding member being a tube, plate or rod	7/00	Sirens
1/067	. . . . Operating or striking mechanisms therefor	7/005	. {Ultrasonic sirens}
1/068	. . hydraulically operated; pneumatically operated	7/02	. in which the sound-producing member is rotated manually or by a motor (G10K 7/06 takes precedence)
1/07	. . mechanically operated; Hand bells; Bells for animals	7/04	. . by an electric motor
1/071	. . . Hand bells; Bells for animals	7/06	. in which the sound-producing member is driven by a fluid, e.g. by a compressed gas
1/072	. . . Operating or striking mechanisms therefor	9/00	Devices in which sound is produced by vibrating a diaphragm or analogous element, e.g. fog horns, vehicle hooters or buzzers (loudspeakers or like acoustic electromechanical transducers H04R)
1/074	. . . . with rotary clappers or shells	9/02	. driven by gas; e.g. suction operated
1/076	. . . . for timed or repeated operation	9/04	. . by compressed gases, e.g. compressed air
1/08	. . Details or accessories of general applicability	9/06	. . produced by detonation
1/10	. . . Sounding members; Mounting thereof; Clappers or other strikers	9/08	. driven by water or other liquids
1/26	. . . Mountings; Casings	9/10	. driven by mechanical means only
1/28	. Bells for towers or the like		
1/30	. . Details or accessories		
1/32	. . . Sounding members; Clappers or other strikers		
1/34	. . . Operating mechanisms		
1/341	. . . . . {for a still-standing bell}		
1/342	. . . . . {electrically operated}		
1/344	. . . . . {for an oscillating bell which is driven once per cycle}		

- 9/12 . . electrically operated
- NOTE**
- This group does not cover the construction of, or circuits for, broadband-transducers such as loudspeakers or microphones, which are covered by subclass [H04R](#).
- 9/121 . . {[Flexensional transducers](#)}
- 9/122 . . using piezoelectric driving means {([G10K 9/121 takes precedence](#))}
- 9/125 . . . with a plurality of active elements
- 9/128 . . using magnetostrictive driving means {([G10K 9/121 takes precedence](#))}
- 9/13 . . using electromagnetic driving means
- NOTE**
- see provisionally also [G10K 9/12](#)
- 9/15 . . . Self-interrupting arrangements
- 9/16 . . with means for generating current by muscle power
- 9/18 . Details, e.g. bulbs, pumps, pistons, switches or casings
- 9/20 . . Sounding members
- 9/22 . . Mountings; Casings
- 11/00 Methods or devices for transmitting, conducting or directing sound in general; Methods or devices for protecting against, or for damping, noise or other acoustic waves in general**
- 11/002 . {[Devices for damping, suppressing, obstructing or conducting sound in acoustic devices](#) ([G10K 1/06 - G10K 1/10 take precedence](#); for electro-mechanical transducers for communication [H04R 3/002](#))}
- 11/004 . {[Mounting transducers, e.g. provided with mechanical moving or orienting device](#) (mountings specially adapted to a particular sound-producing device, see the preceding groups [G10K 1/00 - G10K 9/00](#), e.g. [G10K 1/26](#), [G10K 1/28](#), [G10K 9/22](#); arrangements of sonic watch equipment on submarines [B63G 8/39](#); buoys [B63B 22/00](#))}
- 11/006 . . {[Transducer mounting in underwater equipment, e.g. sonobuoys](#)}
- 11/008 . . . {[Arrays of transducers](#) ([seismic streamers](#), see [G01V 1/20](#))}
- 11/02 . Mechanical acoustic impedances; Impedance matching, e.g. by horns; Acoustic resonators
- 11/025 . . {[horns for impedance matching](#) (see provisionally also [G10K 11/28](#))}
- 11/04 . . Acoustic filters {; [Acoustic resonators](#)}
- 11/08 . Non-electric sound-amplifying devices, e.g. non-electric megaphones ([amplifying by horns](#) [G10K 11/02](#); [amplifying by focusing](#) [G10K 11/26](#))
- 11/16 . Methods or devices for protecting against, or for damping, noise or other acoustic waves in general ([G10K 11/36 takes precedence](#))
- NOTE**
- This group does not cover protecting against, or damping of, acoustic waves adapted for particular applications, which are covered by the subclasses for these applications, provided that there is a specific provision for this aspect.
- 11/161 . . {[in systems with fluid flow](#) ([G10K 11/162 takes precedence](#); gas flow silencers or exhaust apparatus for machines or engines in general or for internal combustion engine [F01N](#), noise absorbers in pipes or pipe systems [F16L 55/02](#); noise absorption in air conditioning and ventilation [F24F 13/24](#); silencing exhaust or propulsion jets in aircraft [B64D 33/06](#))}
- 11/162 . . Selection of materials
- 11/165 . . . Particles in a matrix
- 11/168 . . . Plural layers of different materials, e.g. sandwiches
- NOTE**
- When classifying in this group, classification is also made in subclass [B32B](#), in so far as any layered product is concerned.
- 11/172 . . using resonance effects
- 11/175 . . using interference effects; Masking sound
- NOTES**
1. Sound/noise masking, classified in [G10K 11/1752 - G10K 11/1754](#),
 2. Acoustic noise cancellation, classified in [G10K 11/178](#)
- 11/1752 . . . {[Masking](#)}
- 11/1754 {[Speech masking](#)}
- 11/178 . . . by electro-acoustically regenerating the original acoustic waves in anti-phase
- NOTE**
- {When classifying in any of the groups [G10K 11/1781 - G10K 11/17861](#), classification is also made in at least one subgroup of [G10K 11/1787](#).}
- 11/1781 {characterised by the analysis of input or output signals, e.g. frequency range, modes, transfer functions}
- 11/17813 {characterised by the analysis of the acoustic paths, e.g. estimating, calibrating or testing of transfer functions or cross-terms}
- 11/17815 {between the reference signals and the error signals, i.e. primary path}
- 11/17817 {between the output signals and the error signals, i.e. secondary path}
- 11/17819 {between the output signals and the reference signals, e.g. to prevent howling}
- 11/17821 {characterised by the analysis of the input signals only}
- 11/17823 {Reference signals, e.g. ambient acoustic environment}
- 11/17825 {Error signals}
- 11/17827 {Desired external signals, e.g. pass-through audio such as music or speech}
- 11/1783 {handling or detecting of non-standard events or conditions, e.g. changing operating modes under specific operating conditions}
- 11/17833 {by using a self-diagnostic function or a malfunction prevention function, e.g. detecting abnormal output levels}

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- 11/17835 {using detection of abnormal input signals}
- 11/17837 {by retaining part of the ambient acoustic environment, e.g. speech or alarm signals that the user needs to hear}
- 11/1785 {Methods, e.g. algorithms; Devices ([G10K 11/1781](#), [G10K 11/1783](#) take precedence)}
- 11/17853 {of the filter}
- 11/17854 {the filter being an adaptive filter}
- 11/17855 {for improving speed or power requirements}
- 11/17857 {Geometric disposition, e.g. placement of microphones}
- 11/17861 {using additional means for damping sound, e.g. using sound absorbing panels}
- 11/1787 {General system configurations}
- 11/17873 {using a reference signal without an error signal, e.g. pure feedforward}
- 11/17875 {using an error signal without a reference signal, e.g. pure feedback}
- 11/17879 {using both a reference signal and an error signal}
- 11/17881 {the reference signal being an acoustic signal, e.g. recorded with a microphone}
- 11/17883 {the reference signal being derived from a machine operating condition, e.g. engine RPM or vehicle speed}
- 11/17885 {additionally using a desired external signal, e.g. pass-through audio such as music or speech}

NOTE

{When classifying in this group, classification is also made in the other appropriate groups under [G10K 11/1787](#).}

- 11/18 Methods or devices for transmitting, conducting or directing sound ([G10K 11/02](#), [G10K 11/36](#) take precedence)
- 11/20 Reflecting arrangements ([G10K 11/28](#) takes precedence)
- 11/205 {for underwater use}
- 11/22 for conducting sound through hollow pipes, e.g. speaking tubes
- 11/24 for conducting sound through solid bodies, e.g. wires
- 11/26 Sound-focusing or directing, e.g. scanning
- 11/28 using reflection, e.g. parabolic reflectors
- 11/30 using refraction, e.g. acoustic lenses
- 11/32 characterised by the shape of the source
- 11/34 using electrical steering of transducer arrays, e.g. beam steering {([constructional aspects B06B 1/0607](#), [B06B 1/085](#))}
- 11/341 {Circuits therefor}
- 11/343 {using frequency variation or different frequencies}
- 11/345 {using energy switching from one active element to another}
- 11/346 {using phase variation}
- 11/348 {using amplitude variation}
- 11/35 using mechanical steering of transducers {or their beams}

- 11/352 {by moving the transducer}
- 11/355 {Arcuate movement}
- 11/357 {by moving a reflector}
- 11/36 Devices for manipulating acoustic surface waves (electro-acoustic amplifiers [H03F 13/00](#); networks comprising electro-acoustic elements [H03H 9/00](#))
- 13/00** **Cones, diaphragms, or the like, for emitting or receiving sound in general** (for electromechanical transducers [H04R 7/00](#))
- 15/00** **Acoustics not otherwise provided for**
- 15/02 Synthesis of acoustic waves (synthesis of speech [G10L 13/00](#))
- NOTE**
see provisionally [G10H](#) e.g. [G10H 1/26](#)
- 15/04 Sound-producing devices ([G10K 15/02](#) takes precedence)
- 15/043 {producing shock waves ([G10K 15/046](#), [G10K 15/06](#) take precedence; generating seismic energy [G01V 1/02](#))}
- 15/046 {using optical excitation, e.g. laser bundle}
- 15/06 using electric discharge
- 15/08 Arrangements for producing a reverberation or echo sound {(modifying acoustic properties to change reverberation time [G10K 11/002](#))}
- 15/10 using time-delay networks comprising electromechanical or electro-acoustic devices
- 15/12 using electronic time-delay networks

2200/00 **Details of methods or devices for transmitting, conducting or directing sound in general**

- 2200/10 Beamforming, e.g. time reversal, phase conjugation or similar
- 2200/11 Underwater, e.g. transducers for generating acoustic waves underwater

2210/00 **Details of active noise control [ANC] covered by [G10K 11/178](#) but not provided for in any of its subgroups**

- 2210/10 Applications
- 2210/101 One dimensional
- 2210/102 Two dimensional
- 2210/103 Three dimensional
- 2210/104 Aircos
- 2210/105 Appliances, e.g. washing machines or dishwashers
- 2210/1051 Camcorder
- 2210/1052 Copiers or other image-forming apparatus, e.g. laser printer
- 2210/1053 Hi-fi, i.e. anything involving music, radios or loudspeakers
- 2210/1054 Refrigerators
- 2210/106 Boxes, i.e. active box covering a noise source; Enclosures
- 2210/107 Combustion, e.g. burner noise control of jet engines
- 2210/108 Communication systems, e.g. where useful sound is kept and noise is cancelled
- 2210/1081 Earphones, e.g. for telephones, ear protectors or headsets
- 2210/1082 Microphones, e.g. systems using "virtual" microphones
- 2210/109 Compressors, e.g. fans

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2210/11	. . Computers, i.e. ANC of the noise created by cooling fan, hard drive or the like	2210/3025	. . . Determination of spectrum characteristics, e.g. FFT
2210/111	. . Directivity control or beam pattern	2210/3026	. . . Feedback
2210/112	. . Ducts	2210/3027	. . . Feedforward
2210/113	. . Elevators	2210/3028	. . . Filtering, e.g. Kalman filters or special analogue or digital filters
2210/114	. . Feeders, i.e. of the vibrating kind	2210/30281	. . . . Lattice filters
2210/115	. . Impact noise, e.g. from typewriter or printer	2210/3029	. . . Fuzzy logic; Genetic algorithms
2210/116	. . Medical; Dental	2210/3031	. . . Hardware, e.g. architecture
2210/1161	. . . NMR or MRI	2210/3032	. . . Harmonics or sub-harmonics
2210/117	. . Nonlinear	2210/3033	. . . Information contained in memory, e.g. stored signals or transfer functions
2210/118	. . Panels, e.g. active sound-absorption panels or noise barriers	2210/3034	. . . Integrators
2210/119	. . Radiation control, e.g. control of sound radiated by vibrating structures	2210/3035	. . . Models, e.g. of the acoustic system
2210/12	. . Rooms, e.g. ANC inside a room, office, concert hall or automobile cabin	2210/30351	. . . . Identification of the environment for applying appropriate model characteristics
2210/121	. . Rotating machines, e.g. engines, turbines, motors; Periodic or quasi-periodic signals in general	2210/3036	. . . Modes, e.g. vibrational or spatial modes
2210/122	. . Seismics	2210/3037	. . . Monitoring various blocks in the flow chart
2210/123	. . Synchrophasors or other applications where multiple noise sources are driven with a particular phase relationship	2210/3038	. . . Neural networks
2210/124	. . Traffic	2210/3039	. . . Nonlinear, e.g. clipping, numerical truncation, thresholding or variable input and output gain
2210/125	. . Transformers	2210/30391	. . . . Resetting of the filter parameters or changing the algorithm according to prevailing conditions
2210/126	. . Transients	2210/3041	. . . Offline
2210/127	. . Underwater acoustics, e.g. for submarine	2210/3042	. . . Parallel processing
2210/128	. . Vehicles	2210/3043	. . . Phase locked loops [PLL]
2210/1281	. . . Aircraft, e.g. spacecraft, airplane or helicopter	2210/3044	. . . Phase shift, e.g. complex envelope processing
2210/1282	. . . Automobiles	2210/3045	. . . Multiple acoustic inputs, single acoustic output
2210/12821	. . . . Rolling noise; Wind and body noise	2210/3046	. . . Multiple acoustic inputs, multiple acoustic outputs
2210/12822	. . . . Exhaust pipes or mufflers	2210/3047	. . . Prediction, e.g. of future values of noise
2210/1283	. . . Trains, trams or the like	2210/3048	. . . Pretraining, e.g. to identify transfer functions
2210/129	. . Vibration, e.g. instead of, or in addition to, acoustic noise	2210/3049	. . . Random noise used, e.g. in model identification
2210/1291	. . . Anti-Vibration-Control, e.g. reducing vibrations in panels or beams	2210/3051	. . . Sampling, e.g. variable rate, synchronous, decimated or interpolated
2210/30	. Means	2210/3052	. . . Simulation
2210/301	. . Computational	2210/3053	. . . Speeding up computation or convergence, or decreasing the computational load
2210/3011	. . . Single acoustic input	2210/3054	. . . Step size variation
2210/3012	. . . Algorithms	2210/3055	. . . Transfer function of the acoustic system
2210/3013	. . . Analogue, i.e. using analogue computers or circuits	2210/3056	. . . Variable gain
2210/3014	. . . Adaptive noise equalizers [ANE], i.e. where part of the unwanted sound is retained	2210/3057	. . . Variation of parameters to test for optimisation
2210/3015	. . . Averaging, e.g. exponential	2210/321	. . Physical
2210/3016	. . . Control strategies, e.g. energy minimization or intensity measurements	2210/3211	. . . Active mounts for vibrating structures with means to actively suppress the vibration, e.g. for vehicles
2210/3017	. . . Copy, i.e. whereby an estimated transfer function in one functional block is copied to another block	2210/3212	. . . Actuator details, e.g. composition or microstructure
2210/3018	. . . Correlators, e.g. convolvers or coherence calculators	2210/32121	. . . . Fluid amplifiers, e.g. modulated gas flow speaker using electrovalves
2210/3019	. . . Cross-terms between multiple in's and out's	2210/3213	. . . Automatic gain control [AGC]
2210/3021	. . . Eigenfrequencies; Eigenvalues, e.g. used to identify most significant couplings between actuators and sensors	2210/3214	. . . Architectures, e.g. special constructional features or arrangements of features
2210/3022	. . . Error paths	2210/3215	. . . Arrays, e.g. for beamforming
2210/3023	. . . Estimation of noise, e.g. on error signals	2210/3216	. . . Cancellation means disposed in the vicinity of the source
2210/30231	. . . . Sources, e.g. identifying noisy processes or components	2210/3217	. . . Collocated sensor and cancelling actuator, e.g. "virtual earth" designs
2210/30232	. . . . Transfer functions, e.g. impulse response	2210/3218	. . . Filters other than the algorithm-related filters
2210/3024	. . . Expert systems, e.g. artificial intelligence	2210/3219	. . . Geometry of the configuration
		2210/3221	. . . Headrests, seats or the like, for personal ANC systems

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- 2210/3222 . . . Manual tuning
- 2210/3223 . . . Materials, e.g. special compositions or gases
- 2210/3224 . . . Passive absorbers
- 2210/3225 . . . Radio or other sources used in ANC for transfer function estimation; Means to avoid interference between desired signals, e.g. from a car stereo, and the ANC signal
- 2210/3226 . . . Sensor details, e.g. for producing a reference or error signal
- 2210/3227 . . . Resonators
- 2210/32271 Active resonators
- 2210/32272 Helmholtz resonators
- 2210/3228 . . . Shunts
- 2210/3229 . . . Transducers
- 2210/32291 Plates or thin films, e.g. PVDF
- 2210/50 . Miscellaneous
- 2210/501 . . Acceleration, e.g. for accelerometers
- 2210/502 . . Ageing, e.g. of the control system
- 2210/503 . . Diagnostics; Stability; Alarms; Failsafe
- 2210/504 . . Calibration
- 2210/505 . . Echo cancellation, e.g. multipath-, ghost- or reverberation-cancellation
- 2210/506 . . Feedback, e.g. howling
- 2210/507 . . Flow or turbulence
- 2210/508 . . Reviews on ANC in general, e.g. literature
- 2210/509 . . Hybrid, i.e. combining different technologies, e.g. passive and active
- 2210/51 . . Improving tonal quality, e.g. mimicking sports cars
- 2210/511 . . Narrow band, e.g. implementations for single frequency cancellation
- 2210/512 . . Wide band, e.g. non-recurring signals