

CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS

(NOTES omitted)

INSTRUMENTS

G10 MUSICAL INSTRUMENTS; ACOUSTICS

(NOTES omitted)

G10K SOUND-PRODUCING DEVICES ([sound-producing toys A63H 5/00](#)); METHODS OR DEVICES FOR PROTECTING AGAINST, OR FOR DAMPING, NOISE OR OTHER ACOUSTIC WAVES IN GENERAL; ACOUSTICS NOT OTHERWISE PROVIDED FOR

NOTES

1. This subclass covers arrangements for generating mechanical vibrations in fluids.
2. This subclass covers also the production of sounds which may not be audible to human beings but which are audible to animals.
3. 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.

1/00	Devices in which sound is produced by striking a resonating body, e.g. bells, chimes, gong (combinations with clocks or watches G04B, G04C; carillons G10F 1/10; {for percussion instruments G10D 13/00})	1/344	. . . . {for an oscillating bell which is driven once per cycle}
		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 (self-interrupting relays H01H 51/34)	1/36	. . . Means for silencing or damping (means or arrangements for avoiding or reducing out-of-balance forces due to motion F16F 15/00)
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 (alarm-clocks G04C 21/00)	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 ; musical tops A63H 1/28)
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 (fluidically operated vibrators B06B 1/18)
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 hooter, buzzer (loudspeakers or like acoustic electromechanical transducers H04R ; arrangement or adaptation for ships B63B 45/08; mechanically driven vibrators B06B 1/10)
1/074	. . . . with rotary clappers or shells	9/02	. driven by gas; e.g. suction operated
1/076	. . . . for timed or repeated operation (alarm-clocks G04B 23/00)	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		
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 }		

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- 9/10 . driven by mechanical means only
- 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 piezo-electric 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, switch, casing {(cones, diaphragms [G10K 13/00](#))}
- 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
- 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](#).}
- WARNING**
Group [G10K 11/178](#) is impacted by reclassification into groups [G10K 11/1781 - G10K 11/17885](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 11/1781 {characterised by the analysis of input or output signals, e.g. frequency range, modes, transfer functions}
- WARNING**
Groups [G10K 11/1781](#), [G10K 11/17813](#), [G10K 11/17815](#), [G10K 11/17817](#), [G10K 11/17819](#), [G10K 11/17821](#), [G10K 11/17823](#), [G10K 11/17825](#), [G10K 11/17827](#) are incomplete pending reclassification of documents from group [G10K 11/178](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 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}

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- 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 modes under specific operating conditions}

WARNING

Groups [G10K 11/1783](#), [G10K 11/17833](#), [G10K 11/17835](#) and [G10K 11/17837](#) are incomplete pending reclassification of documents from group [G10K 11/178](#).

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

- 11/17833 {by using a self-diagnostic function or a malfunction prevention function, e.g. detecting abnormal output levels}
- 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)}

WARNING

Groups [G10K 11/1785](#), [G10K 11/17853](#), [G10K 11/17854](#), [G10K 11/17855](#), [G10K 11/17857](#) and [G10K 11/17861](#) are incomplete pending reclassification of documents from group [G10K 11/178](#).

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

- 11/17853 {of the filter, e.g. leakage tuning}
- 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}

WARNING

Groups [G10K 11/1787](#), [G10K 11/17873](#), [G10K 11/17875](#), [G10K 11/17879](#), [G10K 11/17881](#), [G10K 11/17883](#) and [G10K 11/17885](#) are incomplete pending reclassification of documents from group [G10K 11/178](#).

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

- 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; [medical stethoscopes A61B 7/02](#))
- 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 {(horns for impedance matching [G10K 11/02](#); megaphones [G10K 11/08](#))}
- 11/28 using reflection, e.g. parabolic reflector {(hearing aids [A61F 11/008](#))}
- 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

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- 15/02 . . Synthesis of acoustic waves ([synthesis of speech G10L](#))
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 . . Aircons
- 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 ([internal combustion engines G10K 2210/121](#))
- 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
- 2210/11 . . Computers, i.e. ANC of the noise created by cooling fan, hard drive or the like
- 2210/111 . . Directivity control or beam pattern
- 2210/112 . . Ducts ([vehicle exhausts G10K 2210/12822](#))
- 2210/113 . . Elevators
- 2210/114 . . Feeders, i.e. of the vibrating kind
- 2210/115 . . Impact noise, e.g. from typewriter or printer
- 2210/116 . . Medical; Dental
- 2210/1161 . . . NMR or MRI
- 2210/117 . . Nonlinear
- 2210/118 . . Panels, e.g. active sound-absorption panels or noise barriers
- 2210/119 . . Radiation control, e.g. control of sound radiated by vibrating structures
- 2210/12 . . Rooms, e.g. ANC inside a room, office, concert hall or automobile cabin
- 2210/121 . . Rotating machines, e.g. engines, turbines, motors; Periodic or quasi-periodic signals in general
- 2210/122 . . Seismics
- 2210/123 . . Synchrophasors or other applications where multiple noise sources are driven with a particular phase relationship
- 2210/124 . . Traffic
- 2210/125 . . Transformers
- 2210/126 . . Transients
- 2210/127 . . Underwater acoustics, e.g. for submarine
- 2210/128 . . Vehicles
- 2210/1281 . . . Aircraft, e.g. spacecraft, airplane or helicopter
- 2210/1282 . . . Automobiles
- 2210/12821 Rolling noise; Wind and body noise
- 2210/12822 Exhaust pipes or mufflers
- 2210/1283 . . . Trains, trams or the like
- 2210/129 . . Vibration, e.g. instead of, or in addition to, acoustic noise
- 2210/1291 . . . Anti-Vibration-Control, e.g. reducing vibrations in panels or beams
- 2210/30 . . Means
- 2210/301 . . Computational
- 2210/3011 . . . Single acoustic input
- 2210/3012 . . . Algorithms
- 2210/3013 . . . Analogue, i.e. using analogue computers or circuits
- 2210/3014 . . . Adaptive noise equalizers [ANE], i.e. where part of the unwanted sound is retained
- 2210/3015 . . . Averaging, e.g. exponential
- 2210/3016 . . . Control strategies, e.g. energy minimization or intensity measurements
- 2210/3017 . . . Copy, i.e. whereby an estimated transfer function in one functional block is copied to another block
- 2210/3018 . . . Correlators, e.g. convolvers or coherence calculators
- 2210/3019 . . . Cross-terms between multiple in's and out's
- 2210/3021 . . . Eigenfrequencies; Eigenvalues, e.g. used to identify most significant couplings between actuators and sensors
- 2210/3022 . . . Error paths
- 2210/3023 . . . Estimation of noise, e.g. on error signals
- 2210/30231 Sources, e.g. identifying noisy processes or components
- 2210/30232 Transfer functions, e.g. impulse response
- 2210/3024 . . . Expert systems, e.g. artificial intelligence
- 2210/3025 . . . Determination of spectrum characteristics, e.g. FFT
- 2210/3026 . . . Feedback
- 2210/3027 . . . Feedforward
- 2210/3028 . . . Filtering, e.g. Kalman filters or special analogue or digital filters
- 2210/30281 Lattice filters
- 2210/3029 . . . Fuzzy logic; Genetic algorithms
- 2210/3031 . . . Hardware, e.g. architecture
- 2210/3032 . . . Harmonics or sub-harmonics

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- 2210/3033 . . . Information contained in memory, e.g. stored signals or transfer functions
- 2210/3034 . . . Integrators
- 2210/3035 . . . Models, e.g. of the acoustic system
- 2210/30351 Identification of the environment for applying appropriate model characteristics
- 2210/3036 . . . Modes, e.g. vibrational or spatial modes
- 2210/3037 . . . Monitoring various blocks in the flow chart
- 2210/3038 . . . Neural networks
- 2210/3039 . . . Nonlinear, e.g. clipping, numerical truncation, thresholding or variable input and output gain
- 2210/30391 Resetting of the filter parameters or changing the algorithm according to prevailing conditions
- 2210/3041 . . . Offline
- 2210/3042 . . . Parallel processing
- 2210/3043 . . . Phase locked loops [PLL]
- 2210/3044 . . . Phase shift, e.g. complex envelope processing
- 2210/3045 . . . Multiple acoustic inputs, single acoustic output
- 2210/3046 . . . Multiple acoustic inputs, multiple acoustic outputs
- 2210/3047 . . . Prediction, e.g. of future values of noise
- 2210/3048 . . . Pretraining, e.g. to identify transfer functions
- 2210/3049 . . . Random noise used, e.g. in model identification
- 2210/3051 . . . Sampling, e.g. variable rate, synchronous, decimated or interpolated
- 2210/3052 . . . Simulation
- 2210/3053 . . . Speeding up computation or convergence, or decreasing the computational load
- 2210/3054 . . . Step size variation
- 2210/3055 . . . Transfer function of the acoustic system
- 2210/3056 . . . Variable gain
- 2210/3057 . . . Variation of parameters to test for optimisation
- 2210/321 . . . Physical
- 2210/3211 . . . Active mounts for vibrating structures with means to actively suppress the vibration, e.g. for vehicles
- 2210/3212 . . . Actuator details, e.g. composition or microstructure
- 2210/32121 Fluid amplifiers, e.g. modulated gas flow speaker using electrovalves
- 2210/3213 . . . Automatic gain control [AGC]
- 2210/3214 . . . Architectures, e.g. special constructional features or arrangements of features
- 2210/3215 . . . Arrays, e.g. for beamforming
- 2210/3216 . . . Cancellation means disposed in the vicinity of the source
- 2210/3217 . . . Collocated sensor and cancelling actuator, e.g. "virtual earth" designs
- 2210/3218 . . . Filters other than the algorithm-related filters
- 2210/3219 . . . Geometry of the configuration
- 2210/3221 . . . Headrests, seats or the like, for personal ANC systems
- 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 ([foil-type piezo-electric elements B06B 1/0688](#))
- 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