

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.

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, gong (combinations with clocks or watches G04B , G04C ; carillons G10F 1/10 ; {for percussion instruments G10D 13/00 })	1/34	. . . . Operating mechanisms
1/06	. the resonating devices having the shape of a bell, plate, rod, or tube (bells for towers G10K 1/28)	1/341	. . . . {for a still-standing bell}
1/062	. . electrically operated {(self-interrupting relays H01H 51/34)}	1/342	. . . . {electrically operated}
1/063	. . . the sounding member being a bell	1/344	. . . . {for an oscillating bell which is driven once per cycle}
1/064	. . . . Operating or striking mechanisms therefor	1/345	. . . . {electrically operated}
1/0645	. . . . {provided with loudness adjustment}	1/347	. . . . {for an oscillating bell which is driven twice per cycle}
1/065	. . . . for timed or repeated operation {(alarm-clocks G04C 21/00)}	1/348	. . . . {electrically operated}
1/066	. . . the sounding member being a tube, plate or rod	1/36	. . . Means for silencing or damping (means or arrangements for avoiding or reducing out-of-balance forces due to motion F16F 15/00)
1/067	. . . . Operating or striking mechanisms therefor	1/38	. . . Supports; Mountings
1/068	. . hydraulically operated; pneumatically operated	3/00	Rattles or like noise-producing devices {, e.g. door-knockers}
1/07	. . mechanically operated; Hand bells; Bells for animals	5/00	Whistles
1/071	. . . Hand bells; Bells for animals	5/02	. Ultrasonic whistles
1/072	. . . Operating or striking mechanisms therefor	7/00	Sirens
1/074	. . . . with rotary clappers or shells	7/005	. {Ultrasonic sirens}
1/076	. . . . for timed or repeated operation {(alarm-clocks G04B 23/00)}	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 })
1/08	. . Details or accessories of general applicability	7/04	. . by an electric motor
1/10	. . . Sounding members; Mounting thereof; Clappers or other strikers	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)}
1/26	. . . Mountings; Casings		
1/28	. Bells for towers or the like		
1/30	. . Details or accessories		
1/32	. . . Sounding members; Clappers or other strikers		

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)	11/08	• Non-electric sound-amplifying devices, e.g. non-electric megaphones (amplifying by horns G10K 11/02 ; amplifying by focusing G10K 11/26)
9/02	• driven by gas; e.g. suction operated	11/16	• Methods or devices for protecting against, or for damping, noise or other acoustic waves in general (G10K 11/36 takes precedence)
9/04	• . by compressed gases, e.g. compressed air		NOTE
9/06	• . produced by detonation		This group <u>does not cover</u> 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.
9/08	• driven by water or other liquids		
9/10	• driven by mechanical means only		
9/12	• electrically operated		
	NOTE		
	This group <u>does not cover</u> the construction of, or circuits for, broadband-transducers such as loudspeakers or microphones, which are covered by subclass H04R .	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)}
9/121	• . {Flexensional transducers}	11/162	• . Selection of materials
9/122	• . using piezo-electric driving means {(G10K 9/121 takes precedence)}	11/165	• . . Particles in a matrix
9/125	• . . with a plurality of active elements	11/168	• . . Plural layers of different materials, e.g. sandwiches
9/128	• . using magnetostrictive driving means {(G10K 9/121 takes precedence)}		NOTE
9/13	• . using electromagnetic driving means		When classifying in this group, classification is also made in subclass B32B , in so far as any layered product is concerned.
	NOTE		
	<u>see</u> provisionally also G10K 9/12	11/172	• . using resonance effects
9/15	• . . Self-interrupting arrangements	11/175	• . using interference effects; Masking sound
9/16	• . with means for generating current by muscle power		NOTES
9/18	• Details, e.g. bulbs, pumps, pistons, switch, casing {(cones, diaphragms G10K 13/00)}		1. Sound/noise masking, classified in G10K 11/1752 - G10K 11/1754 ,
9/20	• . Sounding members		2. Acoustic noise cancellation, classified in G10K 11/178
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	11/1752	• . . {Masking}
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)}	11/1754	• . . . {Speech masking}
11/004	• {Mounting transducers, e.g. provided with mechanical moving or orienting device (mountings specially adapted to a particular sound-producing device, <u>see</u> 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)}	11/178	• . . by electro-acoustically regenerating the original acoustic waves in anti-phase
11/006	• . {Transducer mounting in underwater equipment, e.g. sonobuoys}		NOTE
11/008	• . . {Arrays of transducers (seismic streamers, <u>see</u> G01V 1/20)}		{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 .}
11/02	• Mechanical acoustic impedances; Impedance matching, e.g. by horns; Acoustic resonators	11/1781	• . . . {characterised by the analysis of input or output signals, e.g. frequency range, modes, transfer functions}
11/025	• . {horns for impedance matching (<u>see</u> provisionally also G10K 11/28)}	11/17813	• {characterised by the analysis of the acoustic paths, e.g. estimating, calibrating or testing of transfer functions or cross-terms}
11/04	• . Acoustic filters ; Acoustic resonators}	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}
- 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; [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 11/30](#))}
- 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](#))
- 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	2210/3016	. . . Control strategies, e.g. energy minimization or intensity measurements
2210/1053	. . . Hi-fi, i.e. anything involving music, radios or loudspeakers	2210/3017	. . . Copy, i.e. whereby an estimated transfer function in one functional block is copied to another block
2210/1054	. . . Refrigerators	2210/3018	. . . Correlators, e.g. convolvers or coherence calculators
2210/106	. . Boxes, i.e. active box covering a noise source; Enclosures	2210/3019	. . . Cross-terms between multiple in's and out's
2210/107	. . Combustion, e.g. burner noise control of jet engines (internal combustion engines G10K 2210/121)	2210/3021	. . . Eigenfrequencies; Eigenvalues, e.g. used to identify most significant couplings between actuators and sensors
2210/108	. . Communication systems, e.g. where useful sound is kept and noise is cancelled	2210/3022	. . . Error paths
2210/1081	. . . Earphones, e.g. for telephones, ear protectors or headsets	2210/3023	. . . Estimation of noise, e.g. on error signals
2210/1082	. . . Microphones, e.g. systems using "virtual" microphones	2210/30231	. . . . Sources, e.g. identifying noisy processes or components
2210/109	. . Compressors, e.g. fans	2210/30232	. . . . Transfer functions, e.g. impulse response
2210/11	. . Computers, i.e. ANC of the noise created by cooling fan, hard drive or the like	2210/3024	. . . Expert systems, e.g. artificial intelligence
2210/111	. . Directivity control or beam pattern	2210/3025	. . . Determination of spectrum characteristics, e.g. FFT
2210/112	. . Ducts (vehicle exhausts G10K 2210/12822)	2210/3026	. . . Feedback
2210/113	. . Elevators	2210/3027	. . . Feedforward
2210/114	. . Feeders, i.e. of the vibrating kind	2210/3028	. . . Filtering, e.g. Kalman filters or special analogue or digital filters
2210/115	. . Impact noise, e.g. from typewriter or printer	2210/30281	. . . . Lattice filters
2210/116	. . Medical; Dental	2210/3029	. . . Fuzzy logic; Genetic algorithms
2210/1161	. . . NMR or MRI	2210/3031	. . . Hardware, e.g. architecture
2210/117	. . Nonlinear	2210/3032	. . . Harmonics or sub-harmonics
2210/118	. . Panels, e.g. active sound-absorption panels or noise barriers	2210/3033	. . . Information contained in memory, e.g. stored signals or transfer functions
2210/119	. . Radiation control, e.g. control of sound radiated by vibrating structures	2210/3034	. . . Integrators
2210/12	. . Rooms, e.g. ANC inside a room, office, concert hall or automobile cabin	2210/3035	. . . Models, e.g. of the acoustic system
2210/121	. . Rotating machines, e.g. engines, turbines, motors; Periodic or quasi-periodic signals in general	2210/30351	. . . . Identification of the environment for applying appropriate model characteristics
2210/122	. . Seismics	2210/3036	. . . Modes, e.g. vibrational or spatial modes
2210/123	. . Synchrophasors or other applications where multiple noise sources are driven with a particular phase relationship	2210/3037	. . . Monitoring various blocks in the flow chart
2210/124	. . Traffic	2210/3038	. . . Neural networks
2210/125	. . Transformers	2210/3039	. . . Nonlinear, e.g. clipping, numerical truncation, thresholding or variable input and output gain
2210/126	. . Transients	2210/30391	. . . . Resetting of the filter parameters or changing the algorithm according to prevailing conditions
2210/127	. . Underwater acoustics, e.g. for submarine	2210/3041	. . . Offline
2210/128	. . Vehicles	2210/3042	. . . Parallel processing
2210/1281	. . . Aircraft, e.g. spacecraft, airplane or helicopter	2210/3043	. . . Phase locked loops [PLL]
2210/1282	. . . Automobiles	2210/3044	. . . Phase shift, e.g. complex envelope processing
2210/12821	. . . . Rolling noise; Wind and body noise	2210/3045	. . . Multiple acoustic inputs, single acoustic output
2210/12822	. . . . Exhaust pipes or mufflers	2210/3046	. . . Multiple acoustic inputs, multiple acoustic outputs
2210/1283	. . . Trains, trams or the like	2210/3047	. . . Prediction, e.g. of future values of noise
2210/129	. . Vibration, e.g. instead of, or in addition to, acoustic noise	2210/3048	. . . Pretraining, e.g. to identify transfer functions
2210/1291	. . . Anti-Vibration-Control, e.g. reducing vibrations in panels or beams	2210/3049	. . . Random noise used, e.g. in model identification
2210/30	. Means	2210/3051	. . . Sampling, e.g. variable rate, synchronous, decimated or interpolated
2210/301	. . Computational	2210/3052	. . . Simulation
2210/3011	. . . Single acoustic input	2210/3053	. . . Speeding up computation or convergence, or decreasing the computational load
2210/3012	. . . Algorithms	2210/3054	. . . Stepsize variation
2210/3013	. . . Analogue, i.e. using analogue computers or circuits	2210/3055	. . . Transfer function of the acoustic system
2210/3014	. . . Adaptive noise equalizers [ANE], i.e. where part of the unwanted sound is retained	2210/3056	. . . Variable gain
2210/3015	. . . Averaging, e.g. exponential	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