

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

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 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	<ul style="list-style-type: none"> electrically operated <p>NOTE</p> <p>This group does not cover the construction of, or circuits for, broadband-transducers such as loudspeakers or microphones, which are covered by subclass H04R.</p>	11/161	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {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	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Flexensional transducers} 	11/162	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Selection of materials
9/122	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using piezoelectric driving means {(G10K 9/121 takes precedence)} 	11/165	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Particles in a matrix
9/125	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> with a plurality of active elements 	11/168	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Plural layers of different materials, e.g. sandwiches
9/128	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using magnetostrictive driving means {(G10K 9/121 takes precedence)} 		
9/13	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using electromagnetic driving means <p>NOTE</p> <p>see provisionally also G10K 9/12</p>		
9/15	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> Self-interrupting arrangements 	11/172	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using resonance effects
9/16	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> with means for generating current by muscle power 	11/175	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using interference effects; Masking sound
9/18	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Details, e.g. bulbs, pumps, pistons, switches or casings 		
9/20	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Sounding members 		
9/22	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Mountings; Casings 		
11/00	<p>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</p>		
11/002	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {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)} 	11/1752	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Masking}
11/004	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {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)} 	11/1754	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Speech masking}
11/006	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Transducer mounting in underwater equipment, e.g. sonobuoys} 	11/178	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> by electro-acoustically regenerating the original acoustic waves in anti-phase
11/008	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Arrays of transducers (seismic streamers, see G01V 1/20)} 		
11/02	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Mechanical acoustic impedances; Impedance matching, e.g. by horns; Acoustic resonators 		
11/025	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {horns for impedance matching (see provisionally also G10K 11/28)} 		
11/04	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Acoustic filters {; Acoustic resonators} 		
11/08	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Non-electric sound-amplifying devices, e.g. non-electric megaphones (amplifying by horns G10K 11/02; amplifying by focusing G10K 11/26) 		
11/16	<ul style="list-style-type: none"> <ul style="list-style-type: none"> Methods or devices for protecting against, or for damping, noise or other acoustic waves in general (G10K 11/36 takes precedence) <p>NOTE</p> <p>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.</p>	11/1781	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {characterised by the analysis of input or output signals, e.g. frequency range, modes, transfer functions}
		11/17813	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {characterised by the analysis of the acoustic paths, e.g. estimating, calibrating or testing of transfer functions or cross-terms}
		11/17815	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {between the reference signals and the error signals, i.e. primary path}
		11/17817	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {between the output signals and the error signals, i.e. secondary path}
		11/17819	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {between the output signals and the reference signals, e.g. to prevent howling}
		11/17821	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {characterised by the analysis of the input signals only}
		11/17823	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Reference signals, e.g. ambient acoustic environment}
		11/17825	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Error signals}
		11/17827	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {Desired external signals, e.g. pass-through audio such as music or speech}
		11/1783	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {handling or detecting of non-standard events or conditions, e.g. changing operating modes under specific operating conditions}
		11/17833	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {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)
- 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 (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	2210/3025	. . .	Determination of spectrum characteristics, e.g. FFT
2210/11	. .	Computers, i.e. ANC of the noise created by cooling fan, hard drive or the like	2210/3026	. . .	Feedback
2210/111	. .	Directivity control or beam pattern	2210/3027	. . .	Feedforward
2210/112	. .	Ducts (vehicle exhausts G10K 2210/12822)	2210/3028	. . .	Filtering, e.g. Kalman filters or special analogue or digital filters
2210/113	. .	Elevators	2210/30281	. . . .	Lattice filters
2210/114	. .	Feeders, i.e. of the vibrating kind	2210/3029	. . .	Fuzzy logic; Genetic algorithms
2210/115	. .	Impact noise, e.g. from typewriter or printer	2210/3031	. . .	Hardware, e.g. architecture
2210/116	. .	Medical; Dental	2210/3032	. . .	Harmonics or sub-harmonics
2210/1161	. . .	NMR or MRI	2210/3033	. . .	Information contained in memory, e.g. stored signals or transfer functions
2210/117	. .	Nonlinear	2210/3034	. . .	Integrators
2210/118	. .	Panels, e.g. active sound-absorption panels or noise barriers	2210/3035	. . .	Models, e.g. of the acoustic system
2210/119	. .	Radiation control, e.g. control of sound radiated by vibrating structures	2210/30351	. . . .	Identification of the environment for applying appropriate model characteristics
2210/12	. .	Rooms, e.g. ANC inside a room, office, concert hall or automobile cabin	2210/3036	. . .	Modes, e.g. vibrational or spatial modes
2210/121	. .	Rotating machines, e.g. engines, turbines, motors; Periodic or quasi-periodic signals in general	2210/3037	. . .	Monitoring various blocks in the flow chart
2210/122	. .	Seismics	2210/3038	. . .	Neural networks
2210/123	. .	Synchrophasors or other applications where multiple noise sources are driven with a particular phase relationship	2210/3039	. . .	Nonlinear, e.g. clipping, numerical truncation, thresholding or variable input and output gain
2210/124	. .	Traffic	2210/30391	. . . .	Resetting of the filter parameters or changing the algorithm according to prevailing conditions
2210/125	. .	Transformers	2210/3041	. . .	Offline
2210/126	. .	Transients	2210/3042	. . .	Parallel processing
2210/127	. .	Underwater acoustics, e.g. for submarine	2210/3043	. . .	Phase locked loops [PLL]
2210/128	. .	Vehicles	2210/3044	. . .	Phase shift, e.g. complex envelope processing
2210/1281	. . .	Aircraft, e.g. spacecraft, airplane or helicopter	2210/3045	. . .	Multiple acoustic inputs, single acoustic output
2210/1282	. . .	Automobiles	2210/3046	. . .	Multiple acoustic inputs, multiple acoustic outputs
2210/12821	. . . .	Rolling noise; Wind and body noise	2210/3047	. . .	Prediction, e.g. of future values of noise
2210/12822	. . . .	Exhaust pipes or mufflers	2210/3048	. . .	Pretraining, e.g. to identify transfer functions
2210/1283	. . .	Trains, trams or the like	2210/3049	. . .	Random noise used, e.g. in model identification
2210/129	. .	Vibration, e.g. instead of, or in addition to, acoustic noise	2210/3051	. . .	Sampling, e.g. variable rate, synchronous, decimated or interpolated
2210/1291	. . .	Anti-Vibration-Control, e.g. reducing vibrations in panels or beams	2210/3052	. . .	Simulation
2210/30	. Means		2210/3053	. . .	Speeding up computation or convergence, or decreasing the computational load
2210/301	. .	Computational	2210/3054	. . .	Stepsize variation
2210/3011	. . .	Single acoustic input	2210/3055	. . .	Transfer function of the acoustic system
2210/3012	. . .	Algorithms	2210/3056	. . .	Variable gain
2210/3013	. . .	Analogue, i.e. using analogue computers or circuits	2210/3057	. . .	Variation of parameters to test for optimisation
2210/3014	. . .	Adaptive noise equalizers [ANE], i.e. where part of the unwanted sound is retained	2210/321	. .	Physical
2210/3015	. . .	Averaging, e.g. exponential	2210/3211	. . .	Active mounts for vibrating structures with means to actively suppress the vibration, e.g. for vehicles
2210/3016	. . .	Control strategies, e.g. energy minimization or intensity measurements	2210/3212	. . .	Actuator details, e.g. composition or microstructure
2210/3017	. . .	Copy, i.e. whereby an estimated transfer function in one functional block is copied to another block	2210/32121	. . . .	Fluid amplifiers, e.g. modulated gas flow speaker using electrovalves
2210/3018	. . .	Correlators, e.g. convolvers or coherence calculators	2210/3213	. . .	Automatic gain control [AGC]
2210/3019	. . .	Cross-terms between multiple in's and out's	2210/3214	. . .	Architectures, e.g. special constructional features or arrangements of features
2210/3021	. . .	Eigenfrequencies; Eigenvalues, e.g. used to identify most significant couplings between actuators and sensors	2210/3215	. . .	Arrays, e.g. for beamforming
2210/3022	. . .	Error paths	2210/3216	. . .	Cancellation means disposed in the vicinity of the source
2210/3023	. . .	Estimation of noise, e.g. on error signals	2210/3217	. . .	Collocated sensor and cancelling actuator, e.g. "virtual earth" designs
2210/30231	. . . .	Sources, e.g. identifying noisy processes or components	2210/3218	. . .	Filters other than the algorithm-related filters
2210/30232	. . . .	Transfer functions, e.g. impulse response	2210/3219	. . .	Geometry of the configuration
2210/3024	. . .	Expert systems, e.g. artificial intelligence	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 piezoelectric 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