

# 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.}

|             |  |             |  |
|-------------|--|-------------|--|
| <b>1/00</b> | <b>Devices in which sound is produced by striking a resonating body, e.g. bells, chimes or gongs (multi-toned musical instruments <a href="#">G10D 13/08</a>; automatic carillons <a href="#">G10F 1/10</a>)</b> | 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 ( <a href="#">bells for towers G10K 1/28</a> )  | 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  | <b>3/00</b> | <b>Rattles or like noise-producing devices {, e.g. door-knockers}</b>  |
| 1/0645      | . . . . . {provided with loudness adjustment}  | <b>5/00</b> | <b>Whistles</b>  |
| 1/065       | . . . . . for timed or repeated operation  | 5/02        | . Ultrasonic whistles  |
| 1/066       | . . . the sounding member being a tube, plate or rod   | <b>7/00</b> | <b>Sirens</b>  |
| 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 ( <a href="#">G10K 7/06</a> 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  | <b>9/00</b> | <b>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 <a href="#">H04R</a>)</b> |
| 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

|            |   |            |   |
|------------|---|------------|---|
| 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  | . . . Stepsize 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  |

## G10K

- 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