

CPC**COOPERATIVE PATENT CLASSIFICATION****G10K**

SOUND-PRODUCING DEVICES (sound-producing toys [A63H 5/00](#) ; musical instruments or parts thereof, see the relevant subclass, e.g. [G10D](#)); **ACOUSTICS NOT OTHERWISE PROVIDED FOR** (systems using the reflection or reradiation of acoustic waves [G01S 15/00](#) ; generating seismic energy [G01V 1/02](#) ; signalling or calling arrangements, alarm arrangements [G08B](#) ; piezo-electric electrostrictive or magnetostrictive elements in general [H01L 41/00](#) ; transmission systems using infrasonic, sonic, or ultrasonic waves [H04B 11/00](#) ; loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers [H04R](#))

NOTE

This subclass covers arrangements for generating mechanical vibrations in fluids.

This subclass covers also 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.

G10K 1/00

Devices in which sound is produced by striking a resonating body, e.g. bell, chimes, gong (combinations with clocks or watches [G04B](#) , [G04C](#) ; carillons [G10F 1/10](#) ; { for percussion instruments [G10D 13/00](#) })

G10K 1/06

. the resonating devices having the shape of a bell, plate, rod, or tube ([bells for towers G10K 1/28](#))

G10K 1/062

.. electrically operated { [self-interrupting relays H01H 51/34](#) }

G10K 1/063

... the sounding member being a bell

G10K 1/064

.... Operating or striking mechanisms therefor

G10K 1/0645

..... { [provided with loudness adjustment](#) }

G10K 1/065

..... for timed or repeated operation { [alarm-clocks G04C 21/00](#) }

G10K 1/066

... the sounding member being a tube, plate or rod

G10K 1/067

.... Operating or striking mechanisms therefor

G10K 1/068

.. hydraulically operated; pneumatically operated

G10K 1/07

.. mechanically operated; Hand bells; Bells for animals

G10K 1/071

... Hand bells; Bells for animals

G10K 1/072

... Operating or striking mechanisms therefor

G10K 1/074

.... with rotary clappers or shells

G10K 1/076

.... for timed or repeated operation { [alarm-clocks G04B 23/00](#) }

G10K 1/08

.. Details or accessories of general applicability

G10K 1/10

... Sounding members; Mounting thereof; Clappers or other strikers

- G10K 1/26 . . . Mountings; Casings
- G10K 1/28 . Bells for towers or the like
- G10K 1/30 . . Details or accessories
- G10K 1/32 . . . Sounding members; Clappers or other strikers
- G10K 1/34 . . . Operating mechanisms
- G10K 1/341 { for a still-standing bell }
- G10K 1/342 { electrically operated }
- G10K 1/344 { for an oscillating bell which is driven once per cycle }
- G10K 1/345 { electrically operated }
- G10K 1/347 { for an oscillating bell which is driven twice per cycle }
- G10K 1/348 { electrically operated }
- G10K 1/36 . . . Means for silencing or damping (means or arrangements for avoiding or reducing out-of-balance forces due to motion [F16F 15/00](#))
- G10K 1/38 . . . Supports; Mountings
- G10K 3/00 Rattles or like noise-producing devices, { e.g. door-knockers }**
- G10K 5/00 Whistles**
- G10K 5/02 . Ultrasonic whistles
- G10K 7/00 Sirens**
- G10K 7/005 . { Ultrasonic sirens }
- G10K 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](#) })
- G10K 7/04 . . by an electric motor
- G10K 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](#)) }
- G10K 9/00 Devices in which sound is produced by vibrating a diaphragm or analogous element, e.g. fog horn, vehicle hooter, buzzer (loudspeakers or like acoustic electromechanical transducers [H04R](#)) { arrangement or adaptation for ships [B63B 45/08](#) ; mechanically driven vibrators [B06B 1/10](#) }**
- G10K 9/02 . driven by gas; e.g. suction operated
- G10K 9/04 . . by compressed gases, e.g. compressed air
- G10K 9/06 . . produced by detonation
- G10K 9/08 . driven by water or other liquids
- G10K 9/10 . driven by mechanical means only
- G10K 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](#) .

- G10K 9/121 . . { Flexensional transducers }
- G10K 9/122 . . using piezo-electric driving means {([G10K 9/121](#) takes precedence)}
- G10K 9/125 . . . with a plurality of active elements
- G10K 9/128 . . using magnetostrictive driving means {([G10K 9/121](#) takes precedence)}
- G10K 9/13 . . using electromagnetic driving means

NOTE

see provisionally also [G10K 9/12](#)

- G10K 9/15 . . . Self-interrupting arrangements
- G10K 9/16 . . with means for generating current by muscle power
- G10K 9/18 . Details, e.g. bulb, pump, piston, switch, casing { [cones](#), [diaphragms](#) [G10K 13/00](#) }
- G10K 9/20 . . Sounding members
- G10K 9/22 . . Mountings; Casings

G10K 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 ({ [protective devices for the ears](#) [A61F 11/06](#) } ; sound insulation for vehicles [B60R 13/08](#) ; sound insulation for aircraft [B64C 1/40](#) ; sound insulating materials, see the relevant places, e.g. [C04B 26/00](#) to [C04B 38/00](#) ; reduction of noise on permanent way [E01B 19/00](#) ; absorption of air-transmitted noise from road or railway traffic [E01F 8/00](#) ; noise insulation, absorption or reflection in buildings [E04B 1/74](#) ; room acoustics [E04B 1/99](#) ; sound insulation in floors [E04F 15/20](#) ; gas-flow silencers or exhaust apparatus for machines or engines in general, for internal-combustion engines [F01N](#) ; intake silencers for internal-combustion engines [F02M 35/00](#) ; suppression of undesired vibrations [F16F 7/00](#) to [G10K 15/00](#) ; preventing noise in valves [F16K 47/02](#) ; noise absorbers in pipes [F16L 55/02](#) ; arrangements for suppressing noise in direct-contact trickle coolers [F28C 1/10](#) ; silencers for weapons [F41](#))

- G10K 11/002 . { [Devices for damping, suppressing, obstructing or conducting sound in acoustic devices](#) ([G10K 1/06](#) to [G10K 1/10](#) take precedence; for electro-mechanical transducers for communication [H04R 3/002](#))}
- G10K 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](#) to [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](#))}
- G10K 11/006 . . { [Transducer mounting in underwater equipment, e.g. sonobuoys](#) }
- G10K 11/008 . . . { [Arrays of transducers](#) ([seismic streamers](#), see [G01V 1/20](#))}
- G10K 11/02 . Mechanical acoustic impedances; Impedance matching, e.g. by horns; Acoustic resonators

- G10K 11/025 . . { horns for impedance matching (see provisionally also [G10K 11/28](#))}
- G10K 11/04 . . Acoustic filters { ; Acoustic resonators }
- G10K 11/08 . Non-electric sound-amplifying devices, e.g. non-electric megaphones (amplifying by horns [G10K 11/02](#) ; amplifying by focusing [G10K 11/26](#))
- G10K 11/16 . Methods or devices for protecting against, or damping of, acoustic waves, e.g. sound ([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.

- G10K 11/161 . . { in systems with fluid flow ([G10K 11/16B](#) 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 13/00C](#) ; silencing exhaust or propulsion jets in aircraft [B64D 33/06](#))}
- G10K 11/162 . . Selection of materials
- G10K 11/165 . . . Particles in a matrix
- G10K 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.

- G10K 11/172 . . . using resonance effects
- G10K 11/175 . . using interference effects; Masking sound
- G10K 11/178 . . . by electro-acoustically regenerating the original acoustic waves in anti-phase
- G10K 11/1782 { using single input }
- G10K 11/1784 { using multiple inputs; single output }
- G10K 11/1786 { using multiple inputs; multiple outputs }
- G10K 11/1788 { Structural details }
- G10K 11/18 . Methods or devices for transmitting, conducting, or directing sound ([G10K 11/02](#) , [G10K 11/36](#) take precedence; medical stethoscopes [A61B 7/02](#))
- G10K 11/20 . . Reflecting arrangements ([G10K 11/28](#) takes precedence)
- G10K 11/205 . . . { for underwater use }
- G10K 11/22 . . for conducting sound through hollow pipes, e.g. speaking tubes
- G10K 11/24 . . for conducting sound through solid bodies, e.g. wire
- G10K 11/26 . . Sound-focusing or directing, e.g. scanning { horns for impedance matching [G10K 11/02](#) ; megaphones [G10K 11/08](#) }
- G10K 11/28 . . . using reflection, e.g. parabolic reflector {(hearing aids [A61F 11/008](#))}
- G10K 11/30 . . . using refraction, e.g. acoustic lenses
- G10K 11/32 . . . characterised by the shape of the source
- G10K 11/34 . . . using electrical steering of transducer arrays, e.g. beam steering {(constructional aspects [B06B 1/0607](#) , [B06B 1/085](#))}

- G10K 11/341 { Circuits therefor }
- G10K 11/343 { using frequency variation or different frequencies }
- G10K 11/345 { using energy switching from one active element to another }
- G10K 11/346 { using phase variation }
- G10K 11/348 { using amplitude variation }
- G10K 11/35 . . . using mechanical steering of transducers { or their beams }
- G10K 11/352 . . . { by moving the transducer }
- G10K 11/355 { Arcuate movement }
- G10K 11/357 . . . { by moving a reflector }

- G10K 11/36 . . . Devices for manipulating acoustic surface waves ([electro-acoustic amplifiers H03F 13/00](#) ; [networks comprising electro-acoustic elements H03H 9/00](#))

- G10K 13/00** **Cones, diaphragms, or the like, for emitting or receiving sound in general (for electromechanical transducers [H04R 7/00](#))**

- G10K 15/00** **Acoustics not otherwise provided for**

- G10K 15/02 . . . Synthesis of acoustic waves ([synthesis of speech G10L](#))

- NOTE**
 see provisionally [G10H](#) e.g. [G10H 1/26](#)

- G10K 15/04 . . . Sound-producing devices ([G10K 15/02](#) takes precedence)
- G10K 15/043 . . . { producing shock waves ([G10K 15/046](#) , [G10K 15/06](#) take precedence; generating seismic energy [G01V 1/02](#)) }
- G10K 15/046 . . . { using optical excitation, e.g. laser bundle }
- G10K 15/06 . . . using electric discharge

- G10K 15/08 . . . Arrangements for producing a reverberation or echo sound { [modifying acoustic properties to change reverberation time G10K 11/002](#) }
- G10K 15/10 . . . using time-delay networks comprising electromechanical or electro-acoustic devices
- G10K 15/12 . . . using electronic time-delay networks

- G10K 2200/00** { Details of methods or devices for transmitting, conducting or directing sound in general }

- G10K 2200/10 . . . Beamforming, e.g. time reversal, phase conjugation or similar
- G10K 2200/11 . . . Underwater, e.g. transducers for generating acoustic waves underwater

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

- G10K 2210/10 . . . Applications

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| G10K 2210/101 | .. | One dimensional |
| G10K 2210/102 | .. | Two dimensional |
| G10K 2210/103 | .. | Three dimensional |
| G10K 2210/104 | .. | Aircos |
| G10K 2210/105 | .. | Appliances, e.g. washing machines or dishwashers |
| G10K 2210/1051 | ... | Camcorder |
| G10K 2210/1052 | ... | Copiers or other image-forming apparatus, e.g. laser printer |
| G10K 2210/1053 | ... | Hi-fi, i.e. anything involving music, radios or loudspeakers |
| G10K 2210/1054 | ... | Refrigerators |
| G10K 2210/106 | .. | Boxes, i.e. active box covering a noise source; Enclosures |
| G10K 2210/107 | .. | Combustion, e.g. burner noise control of jet engines (internal combustion engines G10K 2210/121) |
| G10K 2210/108 | .. | Communication systems, e.g. where useful sound is kept and noise is cancelled |
| G10K 2210/1081 | ... | Earphones, e.g. for telephones, ear protectors or headsets |
| G10K 2210/1082 | ... | Microphones, e.g. systems using "virtual" microphones |
| G10K 2210/109 | .. | Compressors, e.g. fans |
| G10K 2210/11 | .. | Computers, i.e. ANC of the noise created by cooling fan, hard drive or the like |
| G10K 2210/111 | .. | Directivity control or beam pattern |
| G10K 2210/112 | .. | Ducts (vehicle exhausts G10K 2210/12822) |
| G10K 2210/113 | .. | Elevators |
| G10K 2210/114 | .. | Feeders, i.e. of the vibrating kind |
| G10K 2210/115 | .. | Impact noise, e.g. from typewriter or printer |
| G10K 2210/116 | .. | Medical; Dental |
| G10K 2210/1161 | ... | NMR or MRI |
| G10K 2210/117 | .. | Nonlinear |
| G10K 2210/118 | .. | Panels, e.g. active sound-absorption panels or noise barriers |
| G10K 2210/119 | .. | Radiation control, e.g. control of sound radiated by vibrating structures |
| G10K 2210/12 | .. | Rooms, e.g. ANC inside a room, office, concert hall or automobile cabin |
| G10K 2210/121 | .. | Rotating machines, e.g. engines, turbines, motors; Periodic or quasi-periodic signals in general |
| G10K 2210/122 | .. | Seismics |
| G10K 2210/123 | .. | Synchrophasors or other applications where multiple noise sources are driven with a particular phase relationship |
| G10K 2210/124 | .. | Traffic |
| G10K 2210/125 | .. | Transformers |
| G10K 2210/126 | .. | Transients |
| G10K 2210/127 | .. | Underwater acoustics, e.g. for submarine |
| G10K 2210/128 | .. | Vehicles |
| G10K 2210/1281 | ... | Aircraft, e.g. spacecraft, airplane or helicopter |
| G10K 2210/1282 | ... | Automobiles |
| G10K 2210/12821 | | Rolling noise; Wind and body noise |
| G10K 2210/12822 | | Exhaust pipes or mufflers |
| G10K 2210/1283 | ... | Trains, trams or the like |

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| G10K 2210/129 | .. | Vibration, e.g. instead of, or in addition to, acoustic noise |
| G10K 2210/1291 | ... | Anti-Vibration-Control, e.g. reducing vibrations in panels or beams |
| G10K 2210/30 | . | Means |
| G10K 2210/301 | .. | Computational |
| G10K 2210/3011 | ... | Single acoustic input |
| G10K 2210/3012 | ... | Algorithms |
| G10K 2210/3013 | ... | Analogue, i.e. using analogue computers or circuits |
| G10K 2210/3014 | ... | Adaptive noise equalizers [ANE], i.e. where part of the unwanted sound is retained |
| G10K 2210/3015 | ... | Averaging, e.g. exponential |
| G10K 2210/3016 | ... | Control strategies, e.g. energy minimization or intensity measurements |
| G10K 2210/3017 | ... | Copy, i.e. whereby an estimated transfer function in one functional block is copied to another block |
| G10K 2210/3018 | ... | Correlators, e.g. convolvers or coherence calculators |
| G10K 2210/3019 | ... | Cross-terms between multiple in's and out's |
| G10K 2210/3021 | ... | Eigenfrequencies; Eigenvalues, e.g. used to identify most significant couplings between actuators and sensors |
| G10K 2210/3022 | ... | Error paths |
| G10K 2210/3023 | ... | Estimation of noise, e.g. on error signals |
| G10K 2210/30231 | | Sources, e.g. identifying noisy processes or components |
| G10K 2210/30232 | | Transfer functions, e.g. impulse response |
| G10K 2210/3024 | ... | Expert systems, e.g. artificial intelligence |
| G10K 2210/3025 | ... | Determination of spectrum characteristics, e.g. FFT |
| G10K 2210/3026 | ... | Feedback |
| G10K 2210/3027 | ... | Feedforward |
| G10K 2210/3028 | ... | Filtering, e.g. Kalman filters or special analogue or digital filters |
| G10K 2210/30281 | | Lattice filters |
| G10K 2210/3029 | ... | Fuzzy logic; Genetic algorithms |
| G10K 2210/3031 | ... | Hardware, e.g. architecture |
| G10K 2210/3032 | ... | Harmonics or sub-harmonics |
| G10K 2210/3033 | ... | Information contained in memory, e.g. stored signals or transfer functions |
| G10K 2210/3034 | ... | Integrators |
| G10K 2210/3035 | ... | Models, e.g. of the acoustic system |
| G10K 2210/30351 | | Identification of the environment for applying appropriate model characteristics |
| G10K 2210/3036 | ... | Modes, e.g. vibrational or spatial modes |
| G10K 2210/3037 | ... | Monitoring various blocks in the flow chart |
| G10K 2210/3038 | ... | Neural networks |
| G10K 2210/3039 | ... | Nonlinear, e.g. clipping, numerical truncation, thresholding or variable input and output gain |
| G10K 2210/30391 | | Resetting of the filter parameters or changing the algorithm according to prevailing conditions |
| G10K 2210/3041 | ... | Offline |

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| G10K 2210/3042 | ... | Parallel processing |
| G10K 2210/3043 | ... | Phase locked loops [PLL] |
| G10K 2210/3044 | ... | Phase shift, e.g. complex envelope processing |
| G10K 2210/3045 | ... | Multiple acoustic inputs, single acoustic output |
| G10K 2210/3046 | ... | Multiple acoustic inputs, multiple acoustic outputs |
| G10K 2210/3047 | ... | Prediction, e.g. of future values of noise |
| G10K 2210/3048 | ... | Pretraining, e.g. to identify transfer functions |
| G10K 2210/3049 | ... | Random noise used e.g. in model identification |
| G10K 2210/3051 | ... | Sampling, e.g. variable rate, synchronous, decimated or interpolated |
| G10K 2210/3052 | ... | Simulation |
| G10K 2210/3053 | ... | Speeding up computation or convergence, or decreasing the computational load |
| G10K 2210/3054 | ... | Stepsize variation |
| G10K 2210/3055 | ... | Transfer function of the acoustic system |
| G10K 2210/3056 | ... | Variable gain |
| G10K 2210/3057 | ... | Variation of parameters to test for optimisation |
| G10K 2210/321 | .. | Physical |
| G10K 2210/3211 | ... | Active mounts for vibrating structures with means to actively suppress the vibration, e.g. for vehicles |
| G10K 2210/3212 | ... | Actuator details, e.g. composition or microstructure |
| G10K 2210/32121 | | Fluid amplifiers, e.g. modulated gas flow speaker using electrovalves |
| G10K 2210/3213 | ... | Automatic gain control [AGC] |
| G10K 2210/3214 | ... | Architectures, e.g. special constructional features or arrangements of features |
| G10K 2210/3215 | ... | Arrays, e.g. for beamforming |
| G10K 2210/3216 | ... | Cancellation means disposed in the vicinity of the source |
| G10K 2210/3217 | ... | Collocated sensor and cancelling actuator, e.g. "virtual earth" designs |
| G10K 2210/3218 | ... | Filters other than the algorithm-related filters |
| G10K 2210/3219 | ... | Geometry of the configuration |
| G10K 2210/3221 | ... | Headrests, seats or the like, for personal ANC systems |
| G10K 2210/3222 | ... | Manual tuning |
| G10K 2210/3223 | ... | Materials, e.g. special compositions or gases |
| G10K 2210/3224 | ... | Passive absorbers |
| G10K 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 |
| G10K 2210/3226 | ... | Sensor details, e.g. for producing a reference or error signal |
| G10K 2210/3227 | ... | Resonators |
| G10K 2210/32271 | | Active resonators |
| G10K 2210/32272 | | Helmholtz resonators |
| G10K 2210/3228 | ... | Shunts |
| G10K 2210/3229 | ... | Transducers |
| G10K 2210/32291 | | Plates or thin films, e.g. PVDF (foil-type piezo-electric elements B06B 1/0688) |
| G10K 2210/50 | . | Miscellaneous |

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| G10K 2210/501 | .. | Acceleration, e.g. for accelerometers |
| G10K 2210/502 | .. | Ageing, e.g. of the control system |
| G10K 2210/503 | .. | Diagnostics; Stability; Alarms; Failsafe |
| G10K 2210/504 | .. | Calibration |
| G10K 2210/505 | .. | Echo cancellation, e.g. multipath-, ghost- or reverberation-cancellation |
| G10K 2210/506 | .. | Feedback, e.g. howling |
| G10K 2210/507 | .. | Flow or turbulence |
| G10K 2210/508 | .. | Reviews on ANC in general, e.g. literature |
| G10K 2210/509 | .. | Hybrid, i.e. combining different technologies, e.g. passive and active |
| G10K 2210/51 | .. | Improving tonal quality, e.g. mimicking sports cars |
| G10K 2210/511 | .. | Narrow band, e.g. implementations for single frequency cancellation |
| G10K 2210/512 | .. | Wide band, e.g. non-recurring signals |