

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

TRANSPORTING

B61 RAILWAYS

(NOTE omitted)

B61L GUIDING RAILWAY TRAFFIC; ENSURING THE SAFETY OF RAILWAY TRAFFIC

(power supply lines for electrically-propelled vehicles [B60M](#); vehicle signalling in general [B60Q](#); brakes or auxiliary equipment [B61H](#), [B61K](#); point or crossing construction [E01B](#); insulated rail joints [E01B 11/54](#); optical devices in general [G02](#); controlling in general [G05](#); electric communication technique [H04](#))

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.

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| <p>1/00 Devices along the route controlled by interaction with the vehicle or vehicle train, {e.g. pedals}(detonators B61L 5/20; operation of points or signals by passage of the vehicle B61L 11/00, B61L 13/00; central traffic control systems controlled by train B61L 27/04; operation of gates, or gates and signals, by approaching vehicle B61L 29/18)</p> <p>1/02 . Electric devices associated with track {, e.g. rail contacts}</p> <p>1/025 . . {actuated by variation of resistance or by piezo-electricity}</p> <p>1/04 . . mechanically actuated by a part of the vehicle</p> <p>1/045 . . . {actuated by fluid-pressure}</p> <p>1/06 . . actuated by deformation of rail; actuated by vibration in rail</p> <p>1/08 . . magnetically actuated; electrostatically actuated</p> <p>1/10 . . actuated by electromagnetic radiation; actuated by particle radiation</p> <p>1/12 . Electric devices associated with overhead trolley wires</p> <p>1/14 . Devices for indicating the passing of the end of the vehicle or vehicle train</p> <p>1/16 . Devices for counting axles; Devices for counting vehicles (counting moving objects in general G06M)</p> <p>1/161 . . {characterised by the counting methods}</p> <p>1/162 . . {characterised by the error correction}</p> <p>1/163 . . {Detection devices}</p> <p>1/164 . . . {Mechanical}</p> <p>1/165 . . . {Electrical}</p> <p>1/166 . . . {Optical}</p> <p>1/167 . . {Circuit details}</p> <p>1/168 . . {Specific transmission details}</p> <p>1/169 . . {Diagnosis}</p> <p>1/18 . Railway track circuits (automatically-operated track circuits specially adapted for section blocking for controlling traffic B61L 23/00; rail joints E01B 11/00)</p> <p>1/181 . . {Details}</p> | <p>1/182 . . . {Use of current of indifferent sort or a combination of different current types}</p> <p>1/183 {Use of means on the vehicle for improving short circuit, e.g. in vehicles with rubber bandages}</p> <p>1/184 {Use of additional conductors for examining leakages between rails}</p> <p>1/185 . . . {Use of direct current}</p> <p>1/186 . . . {Use of rectified alternating current}</p> <p>1/187 . . . {Use of alternating current}</p> <p>1/188 . . . {Use of coded current}</p> <p>1/20 . Safety arrangements for preventing or indicating malfunction of the device, e.g. by leakage current, by lightning {(remote indicating means for abnormal operations conditions G08B 21/00, G08B 23/00; detectors for indicating the overheating of axle bearings B61K 9/00)}</p> <p>3/00 Devices along the route for controlling devices on the vehicle or vehicle train, e.g. to release brake, to operate a warning signal</p> <p>3/002 . {Recorders on the vehicle}</p> <p>3/004 . {Memory means reproducing during the running of the vehicle or vehicle train, e.g. smart cards}</p> <p>3/006 . {On-board optimisation of vehicle or vehicle train operation (track-side optimisation of operation B61L 27/0027)}</p> <p>3/008 . {On-board target speed calculation or supervision (track-side control of safe travel B61L 27/0038; speed control circuitry B60L 3/08; speed control of electric drives B60L 15/20)}</p> <p>3/02 . at selected places along the route, e.g. intermittent control {simultaneous mechanical and electrical control}</p> <p>3/04 . . controlling mechanically {(arrangements of making elements acting directly on tread B60T 1/04)}</p> <p>3/06 . . controlling by electromagnetic or particle radiation, e.g. by light beam (using radio waves B61L 3/12)</p> |
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| 3/065 | . . . {controlling optically} | 5/04 | . Fluid-pressure devices for operating points or scotch-blocks |
| 3/08 | . . controlling electrically | 5/045 | . . {using electrically controlled fluid-pressure operated driving means} |
| 3/10 | . . . using current passing between devices along the route and devices on the vehicle train | 5/06 | . Electric devices for operating points or scotch-blocks {, e.g. using electromotive driving means} |
| 3/103 | {Details of current transmitting conductors or contact brushes} | 5/062 | . . {Wiring diagrams} |
| 3/106 | {with mechanically controlled electrical switch on the vehicle} | 5/065 | . . {Construction of driving mechanism} |
| 3/12 | . . . using magnetic or electrostatic induction; using radio waves | 5/067 | . . {using electromagnetic driving means} |
| 3/121 | {using magnetic induction} | 5/08 | . Underground actuating arrangements, e.g. for tramways |
| 2003/122 | {German standard for inductive train protection, called "Induktive Zugsicherung"[INDUSI]} | 5/10 | . Locking mechanisms for points; Means for indicating the setting of points |
| 2003/123 | {French standard for inductive train protection, called "Contrôle de vitesse par balises" [KVB]} | 5/102 | . . {Controlling electrically} |
| 3/125 | {using short-range radio transmission (long-range radio transmission B61L 15/0027 , B61L 27/0005)} | 5/105 | . . {Controlling funicularly} |
| 3/126 | {Constructional details} | 5/107 | . . {electrical control of points position} |
| 3/127 | {for remote control of locomotives (remote control of locomotives within a train consist B61C 17/12)} | 5/12 | . Visible signals {(signalling means on the vehicle B61L 15/00 ; signalling means for classification yards, or the like, with multiple indicating means B61L 17/023 ; signalling means for road crossings B61L 29/24 ; lighting in general F21 ; visible signalling arrangements in general G08B 5/00)} |
| 3/128 | {for control of tilting trains by external control devices, e.g. by Eurobalise (tilting details B61F 5/22)} | 5/125 | . . {Fixed signals, beacons, or the like} |
| 3/14 | . . to cut-off the power supply to traction motors of electrically-propelled vehicles | 5/14 | . . Form signals, e.g. semaphore arms {(illumination for points, form signals B61L 9/00)} |
| 3/16 | . Continuous control along the route | 5/16 | . . . Local operating mechanisms for form signals |
| 3/18 | . . using electric current passing between devices along the route and devices on the vehicle or vehicle train | 5/161 | {using electromotive driving means} |
| 3/185 | . . . {using separate conductors} | 5/162 | {Wiring diagrams} |
| 3/20 | . . . employing different frequencies or coded pulse groups {, e.g. using currents carried by traction current (operating and signalling systems using network power supply H02J 13/00)} | 5/163 | {Driving mechanisms} |
| 3/22 | . . using magnetic or electrostatic induction; using electromagnetic radiation | 5/165 | {using electromagnetic driving means} |
| 3/221 | . . . {using track circuits} | 5/166 | {using electrically controlled gravity operated driving means} |
| 3/222 | {Arrangements on the track only} | 5/167 | {using electrically controlled fluid-pressure operated driving means} |
| 2003/223 | {French cab signaling system, called "Transmission Voie-Machine" [TVM]} | 5/168 | {using funicular driving means} |
| 3/225 | . . . {using separate conductors along the route} | 5/18 | . . Light signals; Mechanisms associated therewith, e.g. blinders |
| 2003/226 | {German inductive continuous train control, called 'Linienzugbeeinflussung' [LZB]} | 5/1809 | . . . {Daylight signals} |
| 3/227 | . . . {using electromagnetic radiation} | 5/1818 | {using mobile coloured screen} |
| 2003/228 | . . . {Constructional details} | 5/1827 | {using light sources of different colours and a common optical system} |
| 3/24 | . . . employing different frequencies or coded pulse groups {, e.g. in combination with track circuits} | 5/1836 | {using light sources of different colours and separate optical systems} |
| 3/243 | {using alternating current} | 5/1845 | {Optical systems, lenses} |
| 3/246 | {using coded current} | 5/1854 | {Mounting and focussing of the light source in a lamp, fixing means} |
| 5/00 | Local operating mechanisms for points or track-mounted scotch-blocks (track-mounted scotch-blocks per se B61K); Visible or audible signals; Local operating mechanisms for visible or audible signals (B61L 11/00 takes precedence) | 5/1863 | {Lamp mountings on a mast} |
| 5/02 | . Mechanical devices for operating points or scotch-blocks {, e.g. local manual control} | 5/1872 | {Mobile mountings arrangements on a mast; Arrangements for hoisting of the lamp along the mast} |
| 5/023 | . . {using funicular driving means} | 5/1881 | {Wiring diagrams for power supply, control or testing} |
| 5/026 | . . {fixing switch-rails to the driving means} | 5/189 | . . . {using flashing light sources (visible signalling in general using flashing light sources G08B 5/38 ; thermal switches operating intermittently H01H 61/06 , H01H 61/08)} |
| | | 5/20 | . Audible signals, e.g. detonator {audible signalling} |
| | | 5/203 | . . {Detonators; Track mounting means; Composition of the detonative product} |
| | | 5/206 | . . {Signalling means for special purposes} |
| | | 5/22 | . . Devices for initiating the release of detonators in a certain position of a signal |
| | | 5/24 | . . Replacement of detonators |

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| 7/00 | Remote control of local operating means for points, signals, or trackmounted scotch-blocks (B61L 11/00 takes precedence; interlocking arrangements B61L 19/00 ; transmission per se, see the relevant classes) | 13/02 | • using mechanical interaction between vehicle and track {(pedals B61L 1/00)} |
| 7/02 | • using mechanical transmission; e.g. wire, lever | 13/04 | • using electrical or magnetic interaction between vehicle and track {, e.g. by conductor circuits using special means or special conductors} |
| 7/021 | • . {Driving wheels or supports for traction wires} | 13/042 | • . {using isolated rail sections} |
| 7/022 | • . {Guiding means or supporting foundations in beton} | 13/045 | • . {using separated rail contacts, pedals or similar (B61L 1/02 takes precedence)} |
| 7/024 | • . {Coupling for wires or traction bars} | 13/047 | • . {controlling inductively or magnetically} |
| 7/025 | • . {Bracing or compensating arrangements} | 15/00 | Indicators provided on the vehicle or vehicle train for signalling purposes {; On-board control or communication systems} |
| 7/027 | • . {Control levers} | 15/0009 | • {wiring diagrams for start- or stop-signals on vehicles having one or more carriages and having electrical communication lines between the carriages} |
| 7/028 | • . {Indicating or fixing arrangements in the event of breaking or tension difference of transmission wires for points, signals or similar} | 15/0018 | • {Communication with or on the vehicle or vehicle train (line transmission systems H04B 3/00)} |
| 7/04 | • using fluid-pressure transmission | 15/0027 | • . {Radio-based, e.g. using GSM-R} |
| 7/06 | • using electrical transmission | 15/0036 | • . {Conductor-based, e.g. using CAN-Bus, train-line or optical fibres} |
| 7/061 | • . {using electromotive driving means} | 15/0045 | • {Destination indicators, identification panels or distinguishing signs on the vehicles (displaying in general G09F)} |
| 7/062 | • . . {Wiring diagrams} | 15/0054 | • {Train integrity supervision, e.g. end-of-train [EOT] devices} |
| 7/063 | • . . {Construction of driving mechanism} | 15/0063 | • {Multiple on-board control systems, e.g. "2 out of 3"-systems (trackside multiple control systems B61L 27/0061)} |
| 7/065 | • . {using electromagnetic driving means} | 15/0072 | • {On-board train data handling (trackside train data handling B61L 27/0077)} |
| 7/066 | • . {using electrically controlled fluid-pressure operated driving means} | 15/0081 | • {On-board diagnosis or maintenance (trackside diagnosis or maintenance B61L 27/0083)} |
| 7/067 | • . {Supply for electric safety arrangements} | 15/009 | • {On-board display devices} |
| 7/068 | • . {Protection against eddy-currents, short-circuits, or the like, for electric safety arrangements} | 15/02 | • Head or tail indicators, e.g. light |
| 7/08 | • . Circuitry | 17/00 | Switching systems for classification yards (rail brakes B61K) |
| 7/081 | • . . {Direct line wire control} | 17/02 | • Details, e.g. indicating degree of track filling |
| 7/083 | • . . {Common line wire control using currents of different amplitudes, polarities, frequencies, or the like} | 17/023 | • . {Signalling; Signals with multiple indicating means} |
| 7/085 | • . . {Common line wire control using synchronous distributors} | 17/026 | • . {Brake devices} |
| 7/086 | • . . {Common line wire control using relay distributors} | 19/00 | Arrangements for interlocking between points and signals by means of a single interlocking device {, e.g. central control (remote control B61L 7/00; station block arrangements B61L 21/00)} |
| 7/088 | • . . {Common line wire control using series of coded pulses} | 19/02 | • Interlocking devices having mechanical or fluid-pressure operation |
| 7/10 | • . . for light signals, e.g. for supervision, back-signalling | 19/023 | • . {purely mechanical (control levers B61L 7/027)} |
| 7/103 | • . . . {Electric control of the setting of signals} | 19/026 | • . {using fluid-pressure operated points or signals} |
| 7/106 | • {for form signals} | 19/04 | • . Detail- e.g. hand lever, back-signalling device |
| 9/00 | Illumination specially adapted for points, form signals, or gates (lighting in general F21) | 19/06 | • Interlocking devices having electrical operation |
| 9/02 | • non-electric | 2019/065 | • . {with electronic means} |
| 9/04 | • electric | 19/08 | • . Special arrangements for power supply for interlocking devices |
| 11/00 | Operation of points from the vehicle or by the passage of the vehicle | 19/10 | • . with mechanical locks |
| 11/02 | • using mechanical interaction between vehicle and track | 19/12 | • . . Details |
| 11/04 | • . Trailable point locks | 19/14 | • . with electrical locks |
| 11/06 | • . with fluid-pressure transmission | 19/16 | • . . Details |
| 11/08 | • using electrical or magnetic interaction between vehicle and track | 21/00 | Station blocking between signal boxes in one yard (interlocking between points and signals by means of a single interlocking device B61L 19/00) |
| 11/083 | • . {Magnetic control} | | |
| 2011/086 | • . {German radio based operations, called "Funkfahrbetrieb" [FFB]} | | |
| 13/00 | Operation of signals from the vehicle or by the passage of the vehicle | | |
| 13/002 | • {actuated by the passage of the vehicle} | | |
| 13/005 | • {optically actuated} | | |
| 13/007 | • {acoustically actuated} | | |

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| 21/02 | • Mechanical locking and release of the route; Repeat locks; Coupling of semaphores | 23/34 | • Control, warnings or like safety means indicating the distance between vehicles or vehicle trains by the transmission of signals therebetween |
| 21/04 | • Electrical locking and release of the route; Electrical repeat locks {(central interlocking B61L 19/00)} | 25/00 | Recording or indicating positions or identities of vehicles or vehicle trains or setting of track apparatus |
| 21/06 | • Vehicle-on-line indication; Monitoring locking and release of the route | 25/02 | • Indicating or recording positions or identities of vehicles or vehicle trains |
| 21/065 | • . {for signals, including signals actuated by the vehicle} | 25/021 | • . {Measuring and recording of train speed} |
| 21/08 | • Order transmission and reception arrangements for giving or withholding permission | 25/023 | • . {Determination of driving direction of vehicle or vehicle train} |
| 21/10 | • Arrangements for trains which are closely following one another (automatic central traffic control systems B61L 27/04) | 25/025 | • . {Absolute localisation, e.g. providing geodetic coordinates} |
| 23/00 | Control, warning, or like safety means along the route or between vehicles or vehicle trains | 25/026 | • . {Relative localisation, e.g. using odometer} |
| 23/002 | • {Control or safety means for heart-points and crossings of aerial railways, funicular rack-railway (points or safety systems for model railways A63H; points, crossings or hearts for aerial railway, funicular rack railway E01B 25/12)} | 25/028 | • . {Determination of vehicle position and orientation within a train consist, e.g. serialisation} |
| 23/005 | • . {Automatic control or safety means for points for operator-less railway, e.g. transportation systems} | 25/04 | • . Indicating or recording train identities |
| 23/007 | • {Safety arrangements on railway crossings} | 25/041 | • . . {using reflecting tags} |
| 23/02 | • for indicating along the route the failure of brakes | 25/043 | • . . {using inductive tags} |
| 23/04 | • for monitoring the mechanical state of the route | 25/045 | • . . {using reradiating tags} |
| 23/041 | • . {Obstacle detection} | 25/046 | • . . {using magnetic tags} |
| 23/042 | • . {Track changes detection} | 25/048 | • . . {using programmable tags} |
| 23/044 | • . . {Broken rails} | 25/06 | • Indicating or recording the setting of track apparatus, e.g. of points, of signals |
| 23/045 | • . . {Rail wear} | 25/065 | • . {for signalling systems on the vehicle using current conduction} |
| 23/047 | • . . {Track or rail movements} | 25/08 | • . Diagrammatic displays |
| 23/048 | • . . {Road bed changes, e.g. road bed erosion} | 27/00 | Central traffic control systems {; Track-side control or specific communication systems} |
| 23/06 | • for warning men working on the route | 27/0005 | • {Details of track-side communication} |
| 23/08 | • for controlling traffic in one direction only (station blocking between signal boxes in one yard B61L 21/00) | 27/0011 | • {Regulation, e.g. scheduling, time tables} |
| 23/10 | • . manually operated {, e.g. block arrangements} | 27/0016 | • . {Preparing schedules} |
| 23/12 | • . partly operated by train | 27/0022 | • . {Following schedules} |
| 23/14 | • . automatically operated | 27/0027 | • . {Track-side optimisation of vehicle or vehicle train operation (on-board optimisation B61L 3/006)} |
| 23/16 | • . . Track circuits specially adapted for section blocking | 27/0033 | • . {Crew rosters and itineraries} |
| 23/161 | • . . . {using current of indifferent sorte or a combination of different current types} | 27/0038 | • {Track-side control of safe travel of vehicle or vehicle train, e.g. braking curve calculation (on-board target speed calculation and supervision B61L 3/008)} |
| 23/163 | • . . . {using direct current} | 2027/0044 | • . {using European Train Control System [ETCS]} |
| 23/165 | • . . . {using rectified alternating current} | 2027/005 | • . {using Communication-based Train Control [CBTC]} |
| 23/166 | • . . . {using alternating current} | 27/0055 | • {Testing or simulation} |
| 23/168 | • . . . {using coded current} | 27/0061 | • {Track-side multiple control systems, e.g. switch-over between different systems, "2 out of 3"-systems (on-board multiple control systems B61L 15/0063)} |
| 23/18 | • . . specially adapted for changing lengths of track sections in dependence upon speed and traffic density | 27/0066 | • . {Backup systems, e.g. switching when failures occur} |
| 23/20 | • . . with transmission of instructions to stations along the route | 27/0072 | • . {Migration, e.g. parallel installations running simultaneously} |
| 23/22 | • for controlling traffic in two directions over the same pair of rails (station blocking between signal boxes in one yard B61L 21/00) | 27/0077 | • {Track-side train data handling, e.g. vehicle or vehicle train data, position reports (on-board train data handling B61L 15/0072)} |
| 23/24 | • . using token systems, e.g. train staffs, tablets | 27/0083 | • {Track-side diagnosis or maintenance, e.g. software upgrades (on-board diagnosis or maintenance B61L 15/0081)} |
| 23/26 | • . with means for actuating signals from the vehicle or by passage of the vehicle | 27/0088 | • . {for track-side elements or systems, e.g. trackside supervision of trackside control system conditions} |
| 23/28 | • . using non-automatic blocking from a place along the route | | |
| 23/30 | • . using automatic section blocking | | |
| 23/32 | • . . with provision for the blocking or passing sidings | | |

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| 27/0094 | . . {for vehicles or vehicle trains, e.g. trackside supervision of train conditions} | 2207/00 | Features of light signals |
| 27/02 | . Manual systems | 2207/02 | . using light-emitting diodes (LEDs) |
| 27/04 | . Automatic systems, e.g. controlled by train; Change-over to manual control | 2210/00 | Vehicle systems |
| 29/00 | Safety means for rail/road crossing traffic | 2210/02 | . Single autonomous vehicles |
| 29/02 | . Guards or obstacles for preventing access to the route (cattle guards connected to the permanent way E01B 17/00) | 2210/04 | . Magnetic elevation vehicles (maglev) |
| 29/023 | . . {Special gates} | | |
| 29/026 | . . . {Preventing access by means of obstacles raising across the route} | | |
| 29/04 | . Gates for level crossings | | |
| 29/06 | . . yielding to vehicles in one direction but operated in a different direction | | |
| 29/08 | . Operation of gates; Combined operation of gates and signals | | |
| 29/10 | . . Means for securing gates in their desired position | | |
| 29/12 | . . Manual operation | | |
| 29/14 | . . . mechanically | | |
| 29/16 | . . . electrically | | |
| 29/18 | . . Operation by approaching rail vehicle or rail vehicle train | | |
| 29/20 | . . . mechanically | | |
| 29/22 | . . . electrically | | |
| 29/222 | {using conductor circuits with separate contacts or conductors} | | |
| 29/224 | {using rail contacts} | | |
| 29/226 | {using track-circuits, closed or short-circuited by train or using isolated rail-sections} | | |
| 29/228 | {using optical means} | | |
| 29/24 | . Means for warning road traffic that a gate is closed or closing, or that rail traffic is approaching, e.g. for visible or audible warning | | |
| 29/243 | . . {Transmission mechanism or acoustical signals for gates} | | |
| 29/246 | . . {Signals or brake- or lighting devices mounted on the road vehicle and controlled from the vehicle train} | | |
| 29/26 | . . mechanically operated | | |
| 29/28 | . . electrically operated | | |
| 29/282 | . . . {magnetic or inductive control by the vehicle} | | |
| 29/284 | . . . {using rail-contacts, rail microphones, or the like, controlled by the vehicle} | | |
| 29/286 | . . . {using conductor circuits controlled by the vehicle} | | |
| 29/288 | . . . {Wiring diagram of the signal control circuits} | | |
| 29/30 | . . . Supervision, e.g. monitoring arrangements | | |
| 29/32 | . . . Timing, e.g. advance warning of approaching train | | |
| 99/00 | Subject matter not provided for in other groups of this subclass | | |
| 2201/00 | Control methods | | |
| 2201/02 | . Fuzzy control | | |
| 2205/00 | Communication or navigation systems for railway traffic | | |
| 2205/02 | . Global system for mobile communication - railways (GSM-R) | | |
| 2205/04 | . Satellite based navigation systems, e.g. GPS | | |