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.

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)
   1/02 . Electric devices associated with track [. e.g. rail contacts]
   1/025 . . (actuated by variation of resistance or by piezoelectricity)
   1/04 . . mechanically actuated by a part of the vehicle
   1/045 . . . (actuated by fluid-pressure)
   1/06 . . . actuated by deformation of rail; actuated by vibration in rail
   1/08 . . . magnetically actuated; electrostatically actuated
   1/10 . . . actuated by electromagnetic radiation; actuated by particle radiation
   1/12 . Electric devices associated with overhead trolley wires
   1/14 . Devices for indicating the passing of the end of the vehicle or vehicle train
   1/16 . Devices for counting axles; Devices for counting vehicles (counting moving objects in general G06M)
   1/161 . . (characterised by the counting methods)
   1/162 . . (characterised by the error correction)
   1/163 . . . (Detection devices)
   1/164 . . . . (Mechanical)
   1/165 . . . . (Electrical)
   1/166 . . . . (Optical)
   1/167 . . . (Circuit details)
   1/168 . . . . (Specific transmission details)
   1/169 . . . . (Diagnosis)
   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)
   1/181 . . (Details)
   1/182 . . . . {Use of current of indifferent sort or a combination of different current types}
   1/183 . . . . {Use of means on the vehicle for improving short circuit, e.g. in vehicles with rubber bandages}
   1/184 . . . . {Use of additional conductors for examining leakages between rails}
   1/185 . . . . {Use of direct current}
   1/186 . . . . {Use of rectified alternating current}
   1/187 . . . . {Use of alternating current}
   1/188 . . . . {Use of coded current}
   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) }
   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
   3/002 . . {Recorders on the vehicle}
   3/004 . . {Memory means reproducing during the running of the vehicle or vehicle train, e.g. smart cards}
   3/006 . . {On-board optimisation of vehicle or vehicle train operation (track-side optimisation of operation B61L 27/0027) }
   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) }
   3/02 . . at selected places along the route, e.g. intermittent control { simultaneous mechanical and electrical control }
   3/04 . . . . {controlling mechanically { (arrangements of making elements acting directly on tread B60T 1/04) } }
   3/06 . . . . {controlling by electromagnetic or particle radiation, e.g. by light beam (using radio waves B61L 3/12) }

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1
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)

5/02 . Mechanical devices for operating points or scotch-blocks [. e.g. local manual control]
5/023 . [using funicular driving means]
5/026 . [fixing switch-rails to the driving means]
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]) 13/04 . using electrical or magnetic interaction between vehicle and track ([e.g. by conductor circuits using special means or special conductors]) 13/042 . using isolated rail sections) 13/045 . using separated rail contacts, pedals or similar (B61L 1/02 takes precedence) 13/047 . controlling inductively or magnetically

Indicators provided on the vehicle or vehicle train for signalling purposes (: On-board control or communication systems) 15/009 . wiring diagrams for start- or stop-signals on vehicles having one or more carriages and having electrical communication lines between the carriages) 15/0018 . (Communication with or on the vehicle or vehicle train (line transmission systems H04B 3/00)) 15/0027 . (Radio-based, e.g. using GSM-R) 15/0036 . (Conductor-based, e.g. using CAN-Bus, train-line or optical fibres) 15/0045 . (Destination indicators, identification panels or distinguishing signs on the vehicles (displaying in general G09F)) 15/0054 . (Train integrity supervision, e.g. end-of-train [EOT] devices) 15/0063 . (Multiple on-board control systems, e.g. “2 out of 3”-systems (trackside multiple control systems B61L 27/0061)) 15/0072 . (On-board train data handling (trackside train data handling B61L 27/0077)) 15/0081 . (On-board diagnosis or maintenance (trackside diagnosis or maintenance B61L 27/0083)) 15/009 . (On-board display devices) 15/02 . Head or tail indicators, e.g. light

Switching systems for classification yards (rail brakes B61K) 17/02 . Details, e.g. indicating degree of track filling 17/023 . (Signalling; Signals with multiple indicating means) 17/026 . (Brake devices)

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)) 19/02 . Interlocking devices having mechanical or fluid-pressure operation 19/023 . (purely mechanical (control levers B61L 7/027)) 19/026 . (using fluid-pressure operated points or signals) 19/04 . Detail- e.g. hand levers, back-signalling device 19/06 . Interlocking devices having electrical operation 2019/065 . (with electronic means) 19/08 . Special arrangements for power supply for interlocking devices 19/10 . with mechanical locks 19/12 . Details 19/14 . with electrical locks 19/16 . Details

Station blocking between signal boxes in one yard (interlocking between points and signals by means of a single interlocking device B61L 19/00)
Mechanical locking and release of the route; Repeat locks; Coupling of semaphores

Electrical locking and release of the route; Electrical repeat locks ([central interlocking B61L 19/00])

Vehicle-on-line indication; Monitoring locking and release of the route

[for signals, including signals actuated by the vehicle]

Order transmission and reception arrangements for giving or withholding permission

Arrangements for trains which are closely following one another (automatic central traffic control systems B61L 27/04)

**23/00 Control, warning, or like safety means along the route or between vehicles or vehicle trains**

(Transfer 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 B01B 25/12))

{Automatic control or safety means for points for operator-less railway, e.g. transportation systems}

{Safety arrangements on railway crossings}

for indicating along the route the failure of brakes

for monitoring the mechanical state of the route

{Obstacle detection}

{Broken rails}

{Rail wear}

{Track or rail movements}

{Road bed changes, e.g. road bed erosion}

for warning men working on the route

for controlling traffic in one direction only (station blocking between signal boxes in one yard B61L 21/00)

... manually operated, e.g. block arrangements

... partly operated by train

... automatically operated

... Track circuits specially adapted for section blocking

... [using current of indifferent sorts or a combination of different current types]

... [using direct current]

... [using rectified alternating current]

... [using alternating current]

... [using coded current]

... specially adapted for changing lengths of track sections in dependence upon speed and traffic density

... with transmission of instructions to stations along the route

... for controlling traffic in two directions over the same pair of rails (station blocking between signal boxes in one yard B61L 21/00)

... using token systems, e.g. train staffs, tablets

... with means for actuating signals from the vehicle or by passage of the vehicle

... using non-automatic blocking from a place along the route

... using automatic section blocking

... with provision for the blocking or passing sidings

**23/34 Control, warnings or like safety means indicating the distance between vehicles or vehicle trains by the transmission of signals therebetween**

**25/00 Recording or indicating positions or identities of vehicles or vehicle trains or setting of track apparatus**

... Indicating or recording positions or identities of vehicles or vehicle trains

... [Measuring and recording of train speed]

... [Determination of driving direction of vehicle or vehicle train]

... [Absolute localisation, e.g. providing geodetic coordinates]

... [Relative localisation, e.g. using odometer]

... [Determination of vehicle position and orientation within a train consist, e.g. serialisation]

... Indicating or recording train identities

... [using reflecting tags]

... [using inductive tags]

... [using reradiating tags]

... [using magnetic tags]

... [using programmable tags]

... Indicating or recording the setting of track apparatus, e.g. of points, of signals

... [for signalling systems on the vehicle using current conduction]

... [Track-side diagnosis or maintenance, e.g. software data handling]

... [Track-side multiple control systems, e.g. switchboard target speed calculation and supervision]

... [Testing or simulation]

... [Crew rosters and itineraries]

... [Track-side control of safe travel of vehicle or vehicle train, e.g. braking curve calculation (on-board target speed calculation and supervision B61L 3/006)]

... [European Train Control System [ETCS]]

... [Communication-based Train Control [CBTC]]

... [Track-side optimisation of vehicle or vehicle train operation (on-board optimisation B61L 3/006)]

... [Back up systems, e.g. switching when failures occur]

... [Migration, e.g. parallel installations running simultaneously]

... [Track-side data handling, e.g. vehicle or vehicle train data, position reports (on-board train data handling B61L 15/0072)]

... [Track-side diagnosis or maintenance, e.g. software upgrades (on-board diagnosis or maintenance B61L 15/0081)]

... [for track-side elements or systems, e.g. trackside supervision of trackside control system conditions]
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<thead>
<tr>
<th>Page</th>
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<th>Description</th>
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<td>. . .</td>
<td>(for vehicles or vehicle trains, e.g. trackside supervision of train conditions)</td>
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<tr>
<td>27/02</td>
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<td>Guards or obstacles for preventing access to the route (cattle guards connected to the permanent way [E01B 17/00])</td>
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<td>[Special gates]</td>
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<td>[Preventing access by means of obstacles raising across the route]</td>
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<td>.</td>
<td>Operation of gates; Combined operation of gates and signals</td>
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**2207/00** Features of light signals
- 2207/02 . using light-emitting diodes (LEDs)

**2210/00** Vehicle systems
- 2210/02 . Single autonomous vehicles
- 2210/04 . Magnetic elevation vehicles (maglev)

**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