CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING
(NOTES omitted)

TRANSPORTING

B60 VEHICLES IN GENERAL
(NOTE omitted)

B60T VEHICLE BRAKE CONTROL SYSTEMS OR PARTS THEREOF; BRAKE CONTROL SYSTEMS OR PARTS THEREOF, IN GENERAL (electrodynamic brake systems for vehicle, in general B60L; brakes per se, i.e. devices where braking effect occurs, including ultimate brake actuators, F16D); ARRANGEMENT OF BRAKING ELEMENTS ON VEHICLES IN GENERAL; PORTABLE DEVICES FOR PREVENTING UNWANTED MOVEMENT OF VEHICLES; VEHICLE MODIFICATIONS TO FACILITATE COOLING OF BRAKES

NOTE

In this subclass, the term "brake control systems" includes brake control systems for vehicles or of general applicability

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

B60T 8/20	covered by	B60T 8/18
B60T 8/22	covered by	B60T 8/18
B60T 8/60 - B60T 8/70	covered by	B60T 8/17
B60T 8/78 - B60T 8/84	covered by	B60T 8/17
B60T 13/122	covered by	B60T 13/147, B60T 13/167
B60T 13/125	covered by	B60T 13/141
B60T 13/128	covered by	B60T 13/145, B60T 13/165
B60T 13/13	covered by	B60T 13/146, B60T 13/166
B60T 13/132	covered by	B60T 13/143, B60T 13/162
B60T 13/135	covered by	B60T 13/144, B60T 13/163
B60T 13/138	covered by	B60T 13/148, B60T 13/168
B60T 13/60	covered by	B60T 13/58
B60T 15/06	covered by	B60T 15/04
B60T 15/08	covered by	B60T 15/04

2. 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 **Arrangements of braking elements, i.e. of those parts where braking effect occurs {specially for vehicles}**
1/005 . {by locking of wheel or transmission rotation}
1/02 . acting by retarding wheels
1/04 . . acting directly on tread
1/06 . . acting otherwise than on tread, e.g. employing rim, drum, disc, or transmission {or on double wheels}
1/062 . . . {acting on transmission parts}
1/065 . . . {employing disc (B60T 1/062 takes precedence)}
1/067 . . . {employing drum (B60T 1/062 takes precedence)}
1/08 . . using fluid or powdered medium
1/087 . . . in hydrodynamic, i.e. non-positive displacement, retarders
1/093 . . . in hydrostatic, i.e. positive displacement, retarders
1/10 . . by utilising wheel movement for accumulating energy, e.g. driving air compressors
1/12 . acting otherwise than by retarding wheels, e.g. jet action
1/14 . . directly on road (portable devices, e.g. chocks B60T 3/00)
1/16 . . by increasing air resistance, e.g. flaps

3/00 **Portable devices for preventing unwanted movement of vehicles, e.g. chocks**

5/00 **Vehicle modifications to facilitate cooling of brakes**

Brake control systems or parts thereof

7/00 **Brake-action initiating means**
7/02 . for personal initiation
7/04 . . foot actuated

7/042 . . . {by electrical means, e.g. using travel or force sensors}
7/045 . . . {with locking and release means, e.g. providing parking brake application}
7/047 . . . . {Hand-actuated release means}
7/06 . . . Disposition of pedal
7/065 . . . . {with means to prevent injuries in case of collision (for vehicle pedals in general by moving them from an operative to an out-of-the way position B60R 21/09)}
7/08 . . hand actuated
7/085 . . . {by electrical means, e.g. travel, force sensors}
7/10 . . . Disposition of hand control
7/101 . . . . {by means of a pull rod}
7/102 . . . . {by means of a tilting lever}
7/104 . . . . . {with a locking mechanism}
7/105 . . . . . . {the lock being released by means of a push button}
7/107 . . . . {with electrical power assistance}
7/108 . . . . {with mechanisms to take up slack in the linkage to the brakes}
7/12 . for automatic initiation; for initiation not subject to will of driver or passenger {(limiting speed of vehicles other than rail vehicles B60K 31/00)}
7/122 . . {for locking of reverse movement}
7/124 . . {Brakes for railway vehicles coming into operation in case of accident, derailment or damage of rolling stock or superstructure (self-acting brakes in general F16D 59/00)}
7/126 . . {Brakes for railway vehicles coming into operation in case of exceeding a predetermined speed (self-acting brakes in general F16D 59/00)}
7/128 . . {Self-acting brakes of different types for railway vehicles (B60T 7/12 takes precedence; self-acting brakes in general F16D 59/00)}
7/14 . . operated upon collapse of driver (deadman's devices for electrically propelled vehicles B60L 3/02)
7/16 . . operated by remote control, i.e. initiating means not mounted on vehicle
7/18 . . . operated by wayside apparatus
7/20 . . specially for trailers, e.g. in case of uncoupling of {or overrunning by} trailer (inertia-actuated overrun brakes B60T 13/08)
7/203 . . . {with automatic brake release or reduction in case of reverse travel, e.g. by means of mechanisms mounted on the draw bar}
7/206 . . . . {by means of mechanisms mounted on trailer drum brakes}
7/22 . . initiated by contact of vehicle, e.g. bumper, with an external object, e.g. another vehicle {, or by means of contactless obstacle detectors mounted on the vehicle}

8/00 Arrangements for adjusting wheel-braking force to meet varying vehicular or ground-surface conditions, e.g. limiting or varying distribution of braking force (by changing number of effective brake cylinders in power brake systems B60T 17/10)

8/17 . Using electrical or electronic regulation means to control braking {(detecting or indicating faulty operation B60T 8/885)}
8/1701 . . {Braking or traction control means specially adapted for particular types of vehicles (for vehicles having more than one drive axle B60T 8/1769)}
8/1703 . . . {for aircrafts}
8/1705 . . . {for rail vehicles}
8/1706 . . . {for single-track vehicles, e.g. motorcycles}
8/1708 . . . {for lorries or tractor-trailer combinations}
8/171 . . Detecting parameters used in the regulation; Measuring values used in the regulation
8/172 . . Determining control parameters used in the regulation, e.g. by calculations involving measured or detected parameters {(B60T 8/17551 takes precedence)}
8/1725 . . . {Using tyre sensors, e.g. Sidewall Torsion sensors [SWT] (for tyre pressure and temperature detection B60C 23/00)}
8/173 . . Eliminating or reducing the effect of unwanted signals, e.g. due to vibrations or electrical noise
8/174 . . characterised by using special control logic, e.g. fuzzy logic {, neural computing}
8/175 . . Brake regulation specially adapted to prevent excessive wheel spin during vehicle acceleration, e.g. for traction control (safety devices for propulsion unit control responsive to, or preventing, skidding of wheels B60K 28/16)
8/1755 . . Brake regulation specially adapted to control the stability of the vehicle, e.g. taking into account yaw rate or transverse acceleration in a curve (road vehicle drive control systems for control of driving stability otherwise than by controlling a particular sub-unit B60W 30/02)
8/17551 . . . {determining control parameters related to vehicle stability used in the regulation, e.g. by calculations involving measured or detected parameters}
8/17552 . . . {responsive to the tire sideslip angle or the vehicle body slip angle}
8/17554 . . . {specially adapted for enhancing stability around the vehicles longitudinal axle, i.e. roll-over prevention (road vehicle drive control systems for roll-over prevention otherwise than by controlling a particular sub-unit B60W 30/04)}
8/17555 . . . {specially adapted for enhancing driver or passenger comfort, e.g. soft intervention or pre-actuation strategies}
8/17557 . . . {specially adapted for lane departure prevention (road vehicle drive control systems for lane keeping otherwise than by controlling a particular sub-unit B60W 30/12)}
8/17558 . . . {specially adapted for collision avoidance or collision mitigation (road vehicle drive control systems for collision avoidance otherwise than by controlling a particular sub-unit B60W 30/09)}
8/176 . . Brake regulation specially adapted to prevent excessive wheel slip during vehicle deceleration, e.g. ABS (B60T 8/1755 takes precedence)
8/1761 . . . responsive to wheel or brake dynamics, e.g. wheel slip, wheel acceleration or rate of change of brake fluid pressure
8/17613 . . . . {based on analogue circuits or digital circuits comprised of discrete electronic elements}
8/17616 . . . . {Microprocessor-based systems}

8/1763 . . . responsive to the coefficient of friction between the wheels and the ground surface (B60T 8/1764 takes precedence)
8/17633 . . . . {based on analogue circuits or digital circuits comprised of discrete electronic elements}
8/17636 . . . . {Microprocessor-based systems}
8/1764 . . . Regulation during travel on surface with different coefficients of friction, e.g. between left and right sides, mu-split {or between front and rear}
8/1766 . . . Proportioning of brake forces according to vehicle axle loads, e.g. front to rear of vehicle
8/1769 . . . specially adapted for vehicles having more than one driven axle, e.g. four-wheel drive vehicles
8/18 . responsive to vehicle weight or load, e.g. load distribution ({using electrical circuitry on regulation means B60T 8/17; } B60T 8/30 takes precedence; responsive to weight and speed condition B60T 8/58)

NOTE

B60T 8/1887 and B60T 8/1893 take precedence over B60T 8/1806 - B60T 8/1881

8/1806 . . {characterised by the calibration process or the means therefor}
8/1812 . . {characterised by the means for pressure reduction}
8/1818 . . . {Lever mechanism}
8/1825 . . . {Means for changing the diaphragm area submitted to pressure}
8/1831 . . . {pressure reducing or limiting valves}
8/1837 . . {characterised by the load-detecting arrangements}
8/1843 . . . {Arrangements for detecting air spring pressure}
8/185 . . . {Arrangements for detecting vehicle level}
8/1856 . . . {Arrangements for detecting suspension spring load (B60T 8/1843 takes precedence)}
8/1862 . . . . {comprising sensors of the type providing a fluid output signal representing the load on the vehicle suspension}
8/1868 . . . . {comprising sensors of the type providing a mechanical output signal representing the load on the vehicle suspension}
8/1875 . . . . {comprising sensors of the type providing an electrical output signal representing the load on the vehicle suspension}
8/1881 . . {characterised by failure-responsive means}
8/1887 . . {especially adapted for tractor-trailer combinations}
8/1893 . . {especially adapted for railway vehicles}
8/24 . responsive to vehicle inclination or change of direction, e.g. negotiating bends {(using electrical circuitry or regulation means B60T 8/17)}
8/241 . . {Lateral vehicle inclination}
8/243 . . . {for roll-over protection}
8/245 . . {Longitudinal vehicle inclination}
8/246 . . {Change of direction}
8/248 . . {Trailer sway, e.g. for preventing jackknifing}
8/26 . characterised by producing differential braking between front and rear wheels {(using electrical circuitry or regulation means B60T 8/17)}
8/261 . . {specially adapted for use in motorcycles}
8/262 . . {using valves with stepped characteristics (B60T 8/261, B60T 8/266 take precedence)}
8/263 . . . {for pneumatic brake systems}
8/265 . . . {for hydraulic brake systems}
8/266 . . {using valves or actuators with external control means (B60T 8/261 takes precedence)}
8/267 . . . {for hybrid systems with different kind of brakes on different axles}
8/268 . . . {using the valves of an ABS, ASR or ESP system}
8/28 . . responsive to deceleration {(B60T 8/261, B60T 8/262, B60T 8/266 take precedence)}
8/282 . . . {using ball and ramp}
8/285 . . . {using horizontal moving mass}
8/287 . . . {using pendulums}
8/30 . . responsive to load {(B60T 8/261, B60T 8/262, B60T 8/266 take precedence)}
8/303 . . . {using pneumatic valves}
8/306 . . . {using hydraulic valves}
8/32 . responsive to a speed condition, e.g. acceleration or deceleration ({using electrical circuitry or regulation means B60T 8/17} ; B60T 8/28 takes precedence; electric devices on electrically propelled vehicles indicating the wheel slip B60L 3/10; measuring linear or angular speed per se G01P 3/00)
8/3205 . . {acceleration (B60T 8/34, B60T 8/52, B60T 8/54, B60T 8/56, B60T 8/58, B60T 8/72, B60T 8/86, B60T 8/88 take precedence)}
8/321 . . {deceleration (B60T 8/34, B60T 8/52, B60T 8/54, B60T 8/56, B60T 8/58, B60T 8/72, B60T 8/86, B60T 8/88 take precedence)}
8/3215 . . . {Systems characterised by having means acting on components of the drive line, e.g. retarder, clutch or differential gear (B60T 8/322 takes precedence)}
8/322 . . . {Systems specially adapted for vehicles driven by more than one axle, e.g. Four Wheel-Drive vehicles}
8/3225 . . . {Systems specially adapted for single-track vehicles, e.g. motorcycles (B60T 8/3235 takes precedence)}
8/323 . . . {Systems specially adapted for tractor-trailer combinations}
8/3235 . . . {Systems specially adapted for rail vehicles}
8/324 . . . . {Speed measurement by means of centrifugal governers or the like}
8/3245 . . . . {responsive to the speed difference between wheels and rail, or between two wheels or two axles}
8/325 . . . {Systems specially adapted for aircraft}
8/3255 . . . {Systems in which the braking action is dependent on brake pedal data}
8/326 . . . . {Hydraulic systems}
8/3265 . . . . . {with control of the booster (B60T 8/3275 takes precedence)}
8/327 . . . . {Pneumatic systems}
8/3275 . . . . {Systems with a braking assistant function, i.e. automatic full braking initiation in dependence of brake pedal velocity}
8/328 . . . {Systems sharing components with other fluid systems onboard the vehicle}
8/3285 . . . . {the other fluid systems being suspension elements}

8/329 . . . {Systems characterised by their speed sensor arrangements}
8/3295 . . . {Systems in which there is a pulsating signal superposed on the command signal}
8/34 . . having a fluid pressure regulator responsive to a speed condition
8/341 . . . {Systems characterised by their valves (B60T 8/36, B60T 8/38 take precedence)}
8/342 . . . . {Pneumatic systems}
8/343 . . . {Systems characterised by their lay-out (B60T 8/349 takes precedence)}
8/344 . . . . {Hydraulic systems}
8/345 . . . . . {having more than one brake circuit per wheel}
8/346 . . . . . {2 Channel systems (B60T 8/345 takes precedence)}
8/347 . . . . . {3 Channel systems (B60T 8/345 takes precedence)}
8/348 . . . . . {4 Channel systems (B60T 8/345 takes precedence)}
8/349 . . . {Systems adapted to control a set of axles, e.g. tandem axles}
8/36 . . . including a pilot valve responding to an electromagnetic force
8/3605 . . . . {wherein the pilot valve is mounted in a circuit controlling the working fluid system}
8/361 . . . . {wherein the pilot valve is mounted in a circuit controlling an auxiliary fluid system}
8/3615 . . . . {Electromagnetic valves specially adapted for anti-lock brake and traction control systems (electromagnetic valves in general F16K 31/06)}
8/362 . . . . . {in pneumatic systems (B60T 8/3655, B60T 8/3675 and B60T 8/369 take precedence)}
8/3625 . . . . . {having at least one vacuum connection}
8/363 . . . . . {in hydraulic systems (B60T 8/3655, B60T 8/3675 and B60T 8/369 take precedence)}
8/3635 . . . . . {switching between more than two connections, e.g. 3/2-valves (B60T 8/364, B60T 8/3645 and B60T 8/365 take precedence)}
8/364 . . . . . {switching between a number of discrete positions as a function of the applied signal, e.g. 3/3-valves (B60T 8/3645 takes precedence)}
8/3645 . . . . . {having more than one electromagnetic coil inside a common housing}
8/365 . . . . . {combining a plurality of functions in one unit, e.g. pressure relief}
8/3655 . . . . . {Continuously controlled electromagnetic valves}
8/366 . . . . . {Valve details}
8/3665 . . . . . {Sliding valves}
8/367 . . . . . {Seat valves, e.g. poppet valves}
8/3675 . . . . . {integrated in modulator units}
8/368 . . . . . {combined with other mechanical components, e.g. pump units, master cylinders}
8/3685 . . . . . {characterised by the mounting of the modulator unit onto the vehicle}
8/369 . . . . . {Valves using piezoelectric elements (in general F16K 31/004)}
8/3695 . . . . {wherein the pilot valve is mounted separately from its power section (B60T 8/3605, B60T 8/361 and B60T 8/3615 take precedence)}
8/38 . . . including valve means of the relay or driver controlled type
8/40 . . . comprising an additional fluid circuit including fluid pressurising means for modifying the pressure of the braking fluid, e.g. including wheel driven pumps for detecting a speed condition, or pumps which are controlled by means independent of the braking system
8/4004 . . . . {Repositioning the piston(s) of the brake control means by means of a fluid pressurising means in order to reduce the brake pressure}
8/4009 . . . . . {the brake control means being the wheel cylinders}
8/4013 . . . . {Fluid pressurising means for more than one fluid circuit, e.g. separate pump units used for hydraulic booster and anti-lock braking}
8/4018 . . . . {Pump units characterised by their drive mechanisms (B60T 8/4095 takes precedence)}
8/4022 . . . . . {Pump units driven by an individual electric motor (B60T 8/4027 takes precedence)}
8/4027 . . . . . {Pump units driven by (parts of) the vehicle propulsion unit}
8/4031 . . . . {Pump units characterised by their construction or mounting (pump units in combination with valve blocks B60T 8/36)}
8/4036 . . . . {Pump units characterised by their failure-responsive means (B60T 8/88 takes precedence)}
8/404 . . . . {Control of the pump unit}
8/4045 . . . . . {involving ON/OFF switching}
8/405 . . . . . {involving the start-up phase}
8/4054 . . . . . {involving the delivery pressure control (B60T 8/4072 takes precedence)}
8/4059 . . . . . {involving the rate of delivery}
8/4063 . . . . . {involving the direction of fluid flow}
8/4068 . . . . {the additional fluid circuit comprising means for attenuating pressure pulsations}
8/4072 . . . . {Systems in which a driver input signal is used as a control signal for the additional fluid circuit which is normally used for braking}
8/4077 . . . . . {Systems in which the booster is used as an auxiliary pressure source}
8/4081 . . . . . {Systems with stroke simulating devices for driver input (B60T 8/4077 takes precedence)}
8/4086 . . . . . {the stroke simulating device being connected to, or integrated in the driver input device}
8/409 . . . . . {characterised by details of the stroke simulating device}
8/4095 . . . . {including wheel driven pumps for detecting a speed condition}
8/42 . . . having expanding chambers for controlling pressure {, i.e. closed systems}

8/4208 . . . . {Debooster systems}
8/4216 . . . . . {having a mechanically actuated expansion unit (B60T 8/4225 and B60T 8/4266 take precedence)}
8/4225 . . . . . {having a fluid actuated expansion unit}
8/4233 . . . . . {with brake pressure relief by introducing fluid pressure into the expansion unit (B60T 8/4241 takes precedence)}
8/4241 . . . . . {pneumatically}
8/425 . . . . . {using a vacuum}
8/4258 . . . . . {with brake pressure relief by creating vacuum inside the expansion unit}
8/4266 . . . . . {having an electro-mechanically actuated expansion unit, e.g. solenoid, electric motor, piezo stack}
8/4275 . . . . {Pump-back systems}
8/4283 . . . . . {having a pressure sensitive inlet valve}
8/4291 . . . . . {having means to reduce or eliminate pedal kick-back}
8/44 . . . co-operating with a power-assist booster means associated with a master cylinder for controlling the release and reapplication of brake pressure through an interaction with the power assist device {, i.e. open systems}
8/441 . . . . {using hydraulic boosters (B60T 8/445, B60T 8/446, B60T 8/447 take precedence)}
8/442 . . . . . {the booster being a fluid return pump, e.g. in combination with a brake pedal force booster}
8/443 . . . . {using compressed air (B60T 8/445, B60T 8/446, B60T 8/448 take precedence)}
8/444 . . . . {using vacuum (B60T 8/445, B60T 8/446, B60T 8/448 take precedence)}
8/445 . . . . {replenishing the released brake fluid volume into the brake piping}
8/446 . . . . {replenishing the released brake fluid volume via the master cylinder}
8/447 . . . . {Reducing the boost of the power-assist booster means to reduce brake pressure}
8/448 . . . . . {the power-assist booster means being a vacuum or compressed air booster}
8/449 . . . . . {of the multiple booster type}
8/46 . . . the pressure being reduced by exhausting fluid
8/48 . . . connecting the brake actuator to an alternative or additional source of fluid pressure {, e.g. traction control systems}
8/4809 . . . . {Traction control, stability control, using both the wheel brakes and other automatic braking systems}
8/4818 . . . . . {in pneumatic brake systems}
8/4827 . . . . . {in hydraulic brake systems}
8/4836 . . . . . {wherein a booster output pressure is used for normal or anti lock braking (B60T 8/4845, B60T 8/4863, B60T 8/489 take precedence)}
8/4845 . . . . . {using a booster or a master cylinder for traction control}
8/4854 . . . . . {pneumatic boosters}
8/4863 . . . . . {closed systems (B60T 8/4845, B60T 8/489 take precedence)}
8/4872 . . . . . {pump-back systems}
8/4881 . . . . . {having priming means}
8/489 . . . . . {using separate traction control modulators}
8/50 . . . having means for controlling the rate at which pressure is reapplied to {or released from} the brake
8/5006 . . . . {Pressure reapplication by pulsing of valves (B60T 8/5012, B60T 8/5018, B60T 8/505, B60T 8/5056 take precedence)}
8/5012 . . . . {Pressure reapplication using a plurality of valves in parallel}
8/5018 . . . . {Pressure reapplication using restrictions (B60T 8/5012, B60T 8/505 take precedence)}
8/5025 . . . . . {in hydraulic brake systems}
8/5031 . . . . . {open systems}
8/5037 . . . . . {closed systems}
8/5043 . . . . . {debooster systems}
8/505 . . . . {Pressure reapplication in a mu-split situation, i.e. a situation with different coefficients of friction on both sides of the vehicle}
8/5056 . . . . {Pressure reapplication using memory devices}
8/5062 . . . . . {using memory chambers}
8/5068 . . . . . {having decay means}
8/5075 . . . . {Pressure release by pulsing of valves (B60T 8/5081, B60T 8/5087 take precedence)}
8/5081 . . . . {Pressure release using a plurality of valves in parallel}
8/5087 . . . . {Pressure release using restrictions (B60T 8/5081 takes precedence)}
8/5093 . . . . . {in hydraulic brake systems}
8/52 . . Torque sensing, i.e. wherein the braking action is controlled by forces producing or tending to produce a twisting or rotating motion on a braked rotating member
8/54 . . by mechanical means
8/56 . . having means for changing the coefficient of friction
8/58 . . responsive to speed and another condition or to plural speed conditions

NOTE

In this group, a single condition which is itself responsive to, or representative of, another single condition is not regarded as plural conditions

8/72 . . responsive to a difference between a speed condition, e.g. deceleration, and a fixed reference
8/74 . . . sensing a rate of change of velocity
8/76 . . . two or more sensing means from different wheels indicative of the same type of speed condition
8/86 . . wherein the brakes are automatically applied in accordance with a speed condition and having means for overriding the automatic braking device when a skid condition occurs
8/88 . . with failure responsive means, i.e. means for detecting and indicating faulty operation of the speed responsive control means
8/885 . . . {using electrical circuitry}
8/90 . . . using a simulated speed signal to test speed responsive control means

8/92 . . . automatically taking corrective action
8/94 . . . . on a fluid pressure regulator
8/96 . . . . on speed responsive control means

10/00 Control or regulation for continuous braking making use of fluid or powdered medium, e.g. for use when descending a long slope
10/02 . with hydrodynamic brake
10/04 . with hydrostatic brake

11/00 Transmitting braking action from initiating means to ultimate brake actuator without power assistance or drive or where such assistance or drive is irrelevant (the power assistance or drive being essential B60T 13/00)
11/04 . transmitting mechanically
11/043 . . {in case of steerable wheels}
11/046 . . {Using cables (B60T 11/043 takes precedence)}
11/06 . . Equalising arrangements
11/08 . . providing variable leverage
11/10 . transmitting by fluid means, e.g. hydraulic
11/101 . . {equalising arrangements}
11/102 . . {in combination with mechanical elements}
11/103 . . {in combination with other control devices (conjoint control of brake system and at least another sub-unit B60W 10/188)}
11/105 . . . {with brake locking after actuation, release of the brake by a different control device, e.g. gear lever}
11/106 . . . . {locking and release of the brake by the clutch}
11/107 . . {overrun brakes with fluid means}
11/108 . . {to a trailer fluid system}
11/12 . . the transmitted force being varied therein (B60T 11/16 - B60T 11/26 take precedence)
11/14 . . the transmitted force being substantially unchanged
11/16 . . Master control, e.g. master cylinders (master cylinders associated with vacuum boosters B60T 13/565)
11/165 . . . {Single master cylinders for pressurised systems}
11/18 . . . Connection thereof to initiating means
11/20 . . . Tandem, side-by-side, or other multiple master cylinder units
11/203 . . . . {Side-by-side configuration}
11/206 . . . . . {with control by a force distributing lever}
11/21 . . . . with two pedals operating on respective circuits, pressures therein being equalised when both pedals are operated together, e.g. for steering (steering non-deflectable wheels or endless tracks by differentially driving ground-engaging elements on opposite vehicle sides using brakes as main steering effecting means B62D 11/08)
11/22 . . . characterised by being integral with reservoir
11/224 . . . with pressure-varying means, e.g. with two stage operation provided by use of different piston diameters including continuous variation from one diameter to another
11/228 . . . Pressure-maintaining arrangements, e.g. for replenishing the master cylinder chamber with fluid from a reservoir (B60T 11/232 takes precedence)
11/232 . . . Recuperation valves
11/236 . . . Piston sealing arrangements
11/24 . . Single initiating means operating on more than one circuit, e.g. dual circuits (multiple master cylinder units B60T 11/20)
11/26 . . Reservoirs (integral with master controls B60T 11/22)
11/28 . . Valves specially adapted therefor (recuperation valves B60T 11/232)
11/30 . . . Bleed valves for hydraulic brake systems
11/32 . . . Automatic cut-off valves for defective pipes
11/323 . . . . {in hydraulic systems}
11/326 . . . . {in pneumatic systems}
11/34 . . . Pressure reducing or limiting valves {(for arrangements for adjusting wheel-braking force responsive to vehicle weight or load B60T 8/1831)}

13/00 Transmitting braking action from initiating means to ultimate brake actuator with power assistance or drive; Brake systems incorporating such transmitting means, e.g. air-pressure brake systems (arrangements for adjusting wheel-braking force to meet varying vehicular or ground-surface conditions B60T 8/00; valves incorporated in such systems B60T 15/00)
13/02 . with mechanical assistance or drive {(combined with fluid pressure B60T 13/588)}
13/04 . . by spring or weight (fluid released B60T 13/10)
13/06 . . by inertia, e.g. flywheel
13/065 . . . {of the propulsion system}
13/08 . . . Overrun brakes
13/10 . with fluid assistance, drive, or release
13/12 . . the fluid being liquid
13/14 . . . using accumulators or reservoirs {fed by pumps}
13/141 . . . . {Systems with distributor valve (B60T 13/147 takes precedence)}
13/142 . . . . {Systems with master cylinder}
13/143 . . . . . {Master cylinder mechanically coupled with booster}
13/144 . . . . . {Pilot valve provided inside booster piston}
13/145 . . . . . {Master cylinder integrated or hydraulically coupled with booster}
13/146 . . . . . {Part of the system directly actuated by booster pressure}
13/147 . . . . . {In combination with distributor valve}
13/148 . . . . {Arrangements for pressure supply}
13/16 . . . using pumps directly, i.e. without interposition of accumulators or reservoirs
13/161 . . . . {Systems with master cylinder}
13/162 . . . . . {Master cylinder mechanically coupled with booster}
13/163 . . . . . {Pilot valve provided inside booster piston}
13/165 . . . . . {Master cylinder integrated or hydraulically coupled with booster}
13/166 . . . . . {Part of the system directly actuated by booster pressure}
13/167 . . . . . {In combination with distributor valve}
13/168 . . . . {Arrangements for pressure supply}
13/18 . . . . with control of pump output delivery {, e.g. by distributor valves (B60T 13/167 takes precedence)}

13/20 . . . . with control of pump driving means
13/22 . . . Brakes applied by springs or weights and released hydraulically
13/24 . . the fluid being gaseous
13/241 . . . {Differential pressure systems}
13/242 . . . . {The control valve is provided as one unit with the servomotor cylinder}
13/243 . . . . . {Mechanical command of the control valve, mechanical transmission to the brakes}
13/244 . . . . . {Mechanical command of the control valve, hydraulic transmission to the brakes}
13/245 . . . . . {Hydraulic command of the control valve, hydraulic transmission to the brake}
13/246 . . . . {The control valve is provided apart from the servomotor cylinder}
13/247 . . . . . {Mechanical command of the control valve, mechanical transmission to the brakes}
13/248 . . . . . {Mechanical command of the control valve, hydraulic transmission to the brakes}
13/249 . . . . . {Hydraulic command of the control valve, hydraulic transmission to the brakes}
13/26 . . . Compressed-air systems
13/261 . . . . {systems with both indirect application and application by springs or weights and released by compressed air}
13/263 . . . . . {specially adapted for coupling with dependent systems, e.g. tractor-trailer systems}
13/265 . . . . . {dependent systems, e.g. trailer systems}
13/266 . . . . {Systems with both direct and indirect application, e.g. in railway vehicles}
13/268 . . . . {using accumulators or reservoirs}
13/36 . . . . direct, i.e. brakes applied directly by compressed air
13/365 . . . . . {for railway vehicles}
13/38 . . . . Brakes applied by springs or weights and released by compressed air {(B60T 13/261 takes precedence)}
13/385 . . . . . {Control arrangements therefor}
13/40 . . . . indirect, i.e. compressed air booster units {indirect systems}
13/403 . . . . . {specially adapted for coupling with dependent systems, e.g. tractor-trailer systems}
13/406 . . . . . {specially adapted for transfer of two or more command signals, e.g. railway systems (with electrical control B60T 13/665)}
13/44 . . . . . with two-chamber booster units
13/45 . . . . . with multiple booster units, e.g. tandem booster units
13/46 . . . Vacuum systems
13/465 . . . . {for railway vehicles}
13/48 . . . . direct, i.e. brakes applied directly by vacuum
13/50 . . . . Brakes applied by springs or weights and released by vacuum
13/52 . . . . indirect, i.e. vacuum booster units
13/56 . . . . . with two-chamber booster units
13/563 . . . . . with multiple booster units, e.g. tandem booster units
13/565 . . . . . characterised by being associated with master cylinders, e.g. integrally formed
13/567 . . . . . characterised by constructional features of the casing or by its strengthening or mounting arrangements
13/5675 . . . . . {Supportstruts}
13/569 . . . . . characterised by piston details, e.g. construction, mounting of diaphragm
13/57 . . . . . characterised by constructional features of control valves
13/573 . . . . . characterised by reaction devices
13/575 . . . . . using resilient discs or pads
13/577 . . . . . using levers
13/58 . . Combined or convertible systems
13/581 . . . {both hydraulic and pneumatic}
13/583 . . . . {using converters}
13/585 . . . {comprising friction brakes and retarders}
13/586 . . . . {the retarders being of the electric type}
13/588 . . . {both fluid and mechanical assistance or drive}
13/62 . . . both straight and automatic
13/64 . . . both single and multiple, e.g. single and tandem
13/66 . . Electrical control in fluid-pressure brake systems
13/662 . . . {characterised by specified functions of the control system components}
13/665 . . . {the systems being specially adapted for transferring two or more command signals, e.g. railway systems (B60T 13/662 takes precedence)}
13/667 . . . . {and combined with electro-magnetic brakes}
13/68 . . . by electrically-controlled valves {(B60T 13/662 and B60T 13/665 take precedence)}
13/683 . . . . {in pneumatic systems or parts thereof (in vacuum systems B60T 13/72)}
13/686 . . . . {in hydraulic systems or parts thereof}
13/70 . . . by fluid-controlled switches
13/72 . . . in vacuum systems {or vacuum booster units}
13/74 . with electrical assistance or drive
13/741 . . {acting on an ultimate actuator}
13/743 . . . {with a spring accumulator}
13/745 . . {acting on a hydraulic system, e.g. a master cylinder}
13/746 . . {and mechanical transmission of the braking action}
13/748 . . {acting on electro-magnetic brakes (combined with fluid-pressure brake systems B60T 13/667)}

15/00 Construction arrangement, or operation of valves incorporated in power brake systems and not covered by groups B60T 11/00 or B60T 13/00 (valve structures responsive to a speed condition B60T 8/34; valves in general F16K)

15/02 . Application and release valves
15/021 . . {Railway control or brake valves}
15/022 . . . {with one slide valve, e.g. an emergency slide valve}
15/024 . . . . {with quick braking action and evacuation of air to a reservoir, to the atmosphere or to the brake cylinder}
15/025 . . {Electrically controlled valves}
15/027 . . . {in pneumatic systems}
15/028 . . . {in hydraulic systems}
15/04 . . Driver's valves

15/041 . . . {controlling auxiliary pressure brakes, e.g. parking or emergency brakes (B60T 15/048 takes precedence)}
15/043 . . . {controlling service pressure brakes (B60T 15/048 takes precedence)}
15/045 . . . . {in multiple circuit systems, e.g. dual circuit systems}
15/046 . . . . . {with valves mounted in tandem}
15/048 . . . {Controlling pressure brakes of railway vehicles}
15/10 . . . for vacuum brakes
15/12 . . . combined with relay valves or the like
15/14 . . . influencing electric control means
15/16 . . . Arrangements enabling systems to be controlled from two or more positions
15/18 . . Triple or other relay valves which allow step-wise application or release and which are actuated by brake-pipe pressure variation to connect brake cylinders or equivalent to compressed air or vacuum source or atmosphere
15/181 . . . {Trailer control valves (B60T 15/20 and B60T 15/243 take precedence)}
15/182 . . . {Trailer brake valves (B60T 15/20 and B60T 15/246 take precedence)}
15/184 . . . {Railway control or brake valves}
15/185 . . . . {with one slide valve}
15/187 . . . . . {with a slide valve for initiation and a second slide valve for control of the braking}
15/188 . . . . . {with a slide valve for initiation and annular valves for control of the braking}
15/20 . . . controlled by two fluid pressures
15/203 . . . . {Trailer control valves (B60T 15/223 takes precedence)}
15/206 . . . . {Trailer brake valves (B60T 15/226 takes precedence)}
15/22 . . . . with one or more auxiliary valves, for braking, releasing, filling reservoirs
15/223 . . . . . {Trailer control valves}
15/226 . . . . . {Trailer brake valves}
15/24 . . . controlled by three fluid pressures
15/243 . . . . {Trailer control valves}
15/246 . . . . {Trailer brake valves}
15/26 . . . . without a quick braking action
15/28 . . . . . and having auxiliary valves
15/30 . . . . with a quick braking action
15/302 . . . . . {Railway control or brake valves with evacuation of air to a reservoir, to the atmosphere or to the brake cylinder}
15/304 . . . . . {with one slide valve}
15/306 . . . . . {with a slide valve for initiation and a second slide valve for control of the braking}
15/308 . . . . . {with a slide valve for initiation and annular valves for control of the braking}
15/32 . . . . . and having auxiliary valves
15/34 . . . controlled alternatively by two or three fluid pressures
15/36 . . Other control devices or valves characterised by definite functions {(electrically controlled valves in fluid-pressure brake systems B60T 15/027, B60T 15/028)}
15/38 . . . for quick take-up and heavy braking, e.g. with auxiliary reservoir for taking-up slack
15/40 . . . . with separate take-up and applying cylinders
15/42 . . . with a quick braking action, i.e. with accelerating valves actuated by brake-pipe pressure variation
15/44 . . . . and operating independently of the main control device
15/46 . . . for retarding braking action to prevent rear vehicles of a vehicle train overtaking the forward ones
15/48 . . . for filling reservoirs
15/50 . . . . with means for limiting or relieving pressure in reservoirs
15/52 . . . for quick release of brakes, e.g. for influencing counter- pressure in triple valve or recirculating air from reservoir or brake cylinder to brake pipe
15/54 . . . for controlling exhaust from triple valve or from brake cylinder
15/56 . . . for filling reservoirs by means of a secondary supply pipe
15/58 . . . for supplying control impulses through a secondary air pipe
15/60 . . . for releasing or applying brakes when vehicles of a vehicle train are uncoupled

17/00 Component parts, details, or accessories of power brake systems not covered by groups B60T 8/00, B60T 13/00 or B60T 15/00, or presenting other characteristic features (air compressors per se F04)
17/002 . {Air treatment devices}
17/004 . . {Draining and drying devices}
17/006 . . {Anti-frost devices}
17/008 . . {Silencer devices}
17/02 . Arrangements of pumps or compressors, or control devices therefor
17/04 . Arrangements of piping, valves in the piping, e.g. cut-off valves, couplings or air hoses (traction couplings involving joints for supply lines, electric circuits, or the like B60D 1/62; couplings peculiar to railway vehicles for, or combined with, couplings or connectors for fluid conduits or electric cables B61G 5/06; pipes, cut-off valves, couplings, air hoses per se F16C, F16K, F16L)
17/043 . . {Brake line couplings, air hoses and stopcocks}
17/046 . . {Devices for pipe guiding and fixing}
17/06 . Applications or arrangements of reservoirs
17/08 . Brake cylinders other than ultimate actuators (with built-in wear-compensating mechanisms, ultimate actuators F16D)
17/081 . . {Single service brake actuators}
17/083 . . {Combination of service brake actuators with spring loaded brake actuators}
17/085 . . {Spring loaded brake actuators}
17/086 . . . {Spring loaded brake actuators with emergency release device}
17/088 . . {Mounting arrangements}
17/10 . . Two or more cylinders acting on the same brake with means for rendering them effective selectively or successively, the number of effective cylinders being variable
17/12 . . . according to vehicle weight
17/14 . . . according to vehicle speed

17/16 . . Locking of brake cylinders
17/18 . Safety devices; Monitoring
17/20 . . Safety devices operable by passengers other than the driver {, e.g. for railway vehicles}
17/22 . . Devices for monitoring or checking brake systems; Signal devices
17/221 . . . {Procedure or apparatus for checking or keeping in a correct functioning condition of brake systems (hydraulic pressure systems in general F15B 19/00, F15B 21/04; testing structures or apparatus G01M)}
17/222 . . . . {by filling or bleeding of hydraulic systems}
17/223 . . . . . {Devices for pressurising brake systems acting on pedal}
17/225 . . . {brake fluid level indicators (level indication in general G01F; H01H)}
17/226 . . . {using devices being responsive to the difference between the fluid pressions in conduits of multiple braking systems}
17/227 . . . . {With additional functions, e.g. by-pass}
17/228 . . . {for railway vehicles}

2201/00 Particular use of vehicle brake systems; Special systems using also the brakes; Special software modules within the brake system controller
2201/02 . Active or adaptive cruise control system; Distance control
2201/022 . . Collision avoidance systems
2201/024 . . Collision mitigation systems
2201/03 . Brake assistants
2201/04 . Hill descent control
2201/06 . Hill holder; Start aid systems on inclined road
2201/08 . Lane monitoring; Lane Keeping Systems
2201/081 . . using distance control
2201/082 . . using alarm actuation
2201/083 . . using active brake actuation
2201/084 . . using suspension control
2201/085 . . using several actuators; Coordination of the lane keeping system with other control systems
2201/086 . . using driver related features
2201/087 . . using active steering actuation
2201/088 . . using transmission control
2201/089 . . using optical detection
2201/09 . Engine drag compensation
2201/10 . Automatic or semi-automatic parking aid systems
2201/12 . Pre-actuation of braking systems without significant braking effect; Optimizing brake performance by reduction of play between brake pads and brake disc
2201/122 . . Pre-actuation in case of ESP control
2201/124 . . Rain brake support [RBS]; Cleaning or drying brake discs, e.g. removing water or dirt
2201/14 . Electronic locking-differential
2201/16 . Curve braking control, e.g. turn control within ABS control algorithm

2210/00 Detection or estimation of road or environment conditions; Detection or estimation of road shapes
2210/10 . Detection or estimation of road conditions
2210/12 . . Friction
2210/122 . . . using fuzzy logic, neural computing
2210/124 . . . Roads with different friction levels
2210/13 . . Aquaplaning, hydroplaning
2210/14 . . Rough roads, bad roads, gravel roads
2210/16 . . Off-road driving conditions
2210/20 . Road shapes
2210/22 . . Banked curves
2210/24 . . Curve radius
2210/30 . Environment conditions or position therewithin
2210/32 . . Vehicle surroundings
2210/34 . . Blind spots
2210/36 . . Global Positioning System [GPS]

2220/00 Monitoring, detecting driver behaviour; Signalling thereof; Counteracting thereof
2220/02 . Driver type; Driving style; Driver adaptive features
2220/03 . Driver counter-steering; Avoidance of conflicts with ESP control
2220/04 . Pedal travel sensor, stroke sensor; Sensing brake request
2220/06 . Adjustment of accelerator pedal reaction forces

2230/00 Monitoring, detecting special vehicle behaviour; Counteracting thereof
2230/02 . Side slip angle, attitude angle, floating angle, drift angle
2230/03 . Overturn, rollover
2230/04 . Jerk, soft-stop; Anti-jerk, reduction of pitch or nose-dive when braking
2230/06 . Tractor-trailer swaying
2230/08 . Driving in reverse

2240/00 Monitoring, detecting wheel/tire behaviour; counteracting thereof
2240/02 . Longitudinal grip (detection of road friction B60T 2210/10)
2240/03 . Tire sensors
2240/04 . Tire deformation
2240/06 . Wheel load; Wheel lift
2240/07 . Tire tolerance compensation
2240/08 . Spare wheel detection; Adjusting brake control in case of spare wheel use

2250/00 Monitoring, detecting, estimating vehicle conditions
2250/02 . Vehicle mass
2250/03 . Vehicle yaw rate
2250/04 . Vehicle reference speed; Vehicle body speed
2250/042 . . Reference speed calculation in ASR or under wheel spinning condition
2250/06 . Sensor zero-point adjustment; Offset compensation
2250/062 . . loosing zero-point calibration of yaw rate sensors when travelling on banked roads or in case of temperature variations

2260/00 Interaction of vehicle brake system with other systems
2260/02 . Active Steering, Steer-by-Wire
2260/022 . . Rear-wheel steering; Four-wheel steering
2260/024 . . Yawing moment compensation during mu-split braking
2260/04 . Automatic transmission
2260/06 . Active Suspension System
2260/08 . Coordination of integrated systems
2260/09 . Complex systems; Conjoint control of two or more vehicle active control systems

2270/00 Further aspects of brake control systems not otherwise provided for

2270/10 . ABS control systems
2270/12 . . for all-wheel drive vehicles
2270/14 . . hydraulic model
2270/20 . ASR control systems
2270/202 . . for all-wheel drive vehicles
2270/203 . . hydraulic system components
2270/204 . . hydraulic model
2270/206 . . Monitoring, e.g. parameter monitoring, plausibility check
2270/208 . . adapted to friction condition
2270/211 . . Setting or adjusting start-control threshold
2270/213 . . Driving off under Mu-split conditions
2270/30 . ESP control system
2270/302 . . for all-wheel drive vehicles
2270/303 . . Stability control with active acceleration
2270/304 . . during driver brake actuation
2270/306 . . hydraulic system components
2270/308 . . hydraulic model
2270/311 . . Predefined control maps, lookup tables
2270/313 . . with less than three sensors (yaw rate, steering angle, lateral acceleration)
2270/40 . Failsafe aspects of brake control systems
2270/402 . . Back-up
2270/403 . . Brake circuit failure
2270/404 . . Brake-by-wire or X-by-wire failsafe
2270/406 . . Test-mode; Self-diagnosis
2270/408 . . Hierarchical failure detection
2270/411 . . Offset failure
2270/413 . . Plausibility monitoring, cross check, redundancy
2270/414 . . Power supply failure
2270/415 . . Short-circuit, open circuit failure
2270/416 . . Wheel speed sensor failure
2270/60 . Regenerative braking
2270/602 . . ABS features related thereto
2270/603 . . ASR features related thereto
2270/604 . . Merging friction therewith; Adjusting their repartition
2270/606 . . Axle differential or center differential features related thereto
2270/608 . . Electronic brake distribution (EBV/EBD) features related thereto
2270/611 . . Engine braking features related thereto
2270/613 . . ESP features related thereto
2270/82 . Brake-by-Wire, EHB
2270/83 . Control features of electronic wedge brake [EWB]
2270/84 . Driver circuits for actuating motor, valve and the like
2270/86 . Optimizing braking by using ESP vehicle or tire model
2270/88 . Pressure measurement in brake systems
2270/89 . Criteria for brake release