

CLASS 303, FLUID-PRESSURE AND ANALOGOUS BRAKE SYSTEMS

SECTION I - CLASS DEFINITION

This class relates to the distribution of fluid to brake motors, i.e., the utilization of fluid-pressure in the operation of brakes.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Systems for the distribution of pressure fluid to a plurality of motors other than brake motors are, for the most part in Class 60, Power Plants, subclasses 6, 97, 420, 484, and their respective indented subclasses, and Class 91, Motors: Expansible Chamber Type, subclasses 165+ and 508+.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

- 60, Power Plants, subclasses 325+ for a pressure fluid source supply motive fluid to an output motor of general utility, particularly subclasses 533+ a master-slave system. See the Search Class reference to Class 303 in subclass 533 of Class 60 for the line between these classes as to pulsators.
- 73, Measuring and Testing, subclass 39 for devices for testing fluid brake systems and triple valves.
- 91, Motors: Expansible Chamber Type, subclasses 508+ for a system of plural expansible chamber motors of general utility and appropriate subclass for an expansible chamber motor, per se.
- 96, Gas Separation: Apparatus, for apparatus for gas separation, per se, which merely dry or separate foreign matter from gaseous brake fluids or which deaerate brake liquids.
- 116, Signals and Indicators, subclass 55 for signal train-pipes supplied with fluid under pressure, the train brake-pipe, when used for signaling, being found in this subclass.
- 137, Fluid Handling, appropriate subclasses for fluid handling systems of more general application, and in particular see subclasses 203+ for devices for collecting and discharging condensate from a low point in the system, subclass 381 for shields to protect exposed valves,

subclasses 545+ for devices for separating foreign matter from the brake fluid, and subclass 598 for distribution systems including a flow passage between a master cylinder and a brake cylinder and means to control the fluid flow, e.g., "hill holders", and see the Note to the definition of this subclass (598).

- 188, Brakes, subclasses 152+ and 154 for application of fluid-pressure operated brakes to motor-vehicles and to all road-vehicles.
- 246, Railway Switches and Signals, subclasses 167+ for operations on the air-distribution system from points on the railway-track.
- 252, Compositions, for fluids for hydraulic brakes or for other hydraulic devices.
- 293, Vehicle Fenders, subclass 5 for the application of a fluid pressure operated brake to a motor vehicle combined with vehicle fender structure.
- 418, Rotary Expansible Chamber Devices, for rotary expansible chamber, per se.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for generic data processing control systems.

SUBCLASSES

- 1 Patents not elsewhere classified.
- 2 Patents showing systems of distribution to two or more motive devices associated in one system, one of which must be a fluid-pressure motive device.
- 3 A motor operated by a fluid is associated with an electric motive device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 15, for distribution of fluid controlled by fluid and electric means.
- 121+, for a speed controlled braking system that controls fluid braking pressure.

- 4 Fluid is used at two pressures, the one above atmospheric and the other at atmospheric pressure, in opposition to a partial vacuum.

- (1) Note. See this class, subclasses 12 and 31 for cases in which a vacuum alone is used.

- 5** The fluid is distributed to a plurality of receivers, one of which must be a brake motor.
- (1) Note. Devices which control brake fluid in response to a speed responsive actuating signal have been excluded from this subclass and its indented subclasses and are found in subclasses 121+ below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
30, for patents in which an additional pipe is used to feed the auxiliary reservoir.
121+, for speed controlled regulation of braking fluid and, therefore, braking action.
- 6.01 Multiple motors:**
This subclass is indented under subclass 5. Subject matter wherein the fluid is distributed to a plurality of fluid pressure operated motors.
- (1) Note. The multiple motors are usually differently related to the means for distributing the fluid.
- 6.1** Includes patents in which one of the motors operates a door.
- SEE OR SEARCH CLASS:
49, Movable or Removable Closures, subclass 334 for a motor driven closure and see the search notes thereto for the loci of other closures driven by a motor.
105, Railway Rolling Stock, the subclasses indented under subclass 238.1 for door operation and door actuators.
- 7** The train is divided into a plurality of sections, the fluid being distributed to the sections in different manner.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
53, for motorman's valves adapted for this service.
- 8** The distribution of fluid to the sections of the train is controlled by a plurality of brake-valves.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
25, and 26, for other patents combining automatic and direct distribution.
- 9** Upon a heavy reduction of control-pipe pressure a second motor is brought into operation.
- 9.61 Separate and simultaneous control:**
This subclass is indented under subclass 6.01. Subject matter including means for regulating the fluid flow to the motors such that one to the motors may be operated (a) independent of another motor and (b) in unison with the other motor, when desired.
- (1) Note. This subclass may also include the sequential control of fluid pressure operated motors.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
50+, for manually controlled valves where details of the manual operation are significant.
- SEE OR SEARCH CLASS:
188, Brakes, subclass 16 and 354 for independently operated brakes.
- 9.62 Apportioning control:**
This subclass is indented under subclass 6.01. Subject matter including means for varying the fluid flow to one motor relative to the flow to another motor, e.g., for varying the braking action of a form brake motor with respect to rear brake motor of a vehicle.
- SEE OR SEARCH CLASS:
188, Brakes, particularly subclass 349 for details of apportioning devices brake structure.
- 9.63 Failure responsive:**
This subclass is indented under subclass 9.62. Subject matter including a feature which functions when the distribution of fluid ceases to occur properly.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
84.1+, for flow retarders and isolation valves which interrupt the fluid flow, usually

upon the failure of some part of the system.

9.64 Motorcycle:

This subclass is indented under subclass 9.62. Subject matter wherein the fluid is distributed to the fluid pressure operated motors of a motorized land vehicle having a single front wheel and at least one rear wheel, e.g., a motorized velocipede.

SEE OR SEARCH CLASS:

188, Brake, subclass 344 for velocipede brake structure.

9.65 Manual:

This subclass is indented under subclass 9.62. Subject matter wherein the means for varying the fluid flow may be actuated by a human operator.

9.66 For pneumatic system:

This subclass is indented under subclass 9.62. Subject matter wherein the fluid being distributed is pressurized air.

(1) Note. The air pressure may be in the form of a vacuum.

(2) Note. The system may also include hydraulic portions.

9.67 Inertia:

This subclass is indented under subclass 9.62. Subject matter wherein the means for varying the fluid flow includes means responsive to a resistance to acceleration, i.e., to inertia.

SEE OR SEARCH THIS CLASS, SUBCLASS:

24.1, for means for controlling fluid distribution by inertia in systems not of the apportioning type.

9.68 Inertia weight:

This subclass is indented under subclass 9.67. Subject matter wherein significance is attributed to a moveable mass responsive to inertia for varying the fluid flow.

9.69 Load:

This subclass is indented under subclass 9.62. Subject matter wherein the means for varying the fluid flow includes means responsive to a

gravity induced load on a supporting machine, e.g., a land vehicle.

SEE OR SEARCH THIS CLASS, SUBCLASS:

22.1+, for means for controlling fluid distribution affected by a load but not of the apportioning type.

9.71 Having significant pressure control by front brake:

This subclass is indented under subclass 9.62. Subject matter wherein the means for varying the fluid flow is substantially affected by the amount of fluid pressure present in a fluid line connected to a fluid pressure operated, forward motor used for stopping a vehicle.

(1) Note. While many front/rear apportioning valves in tandem brake systems have a front pressure line connected thereto, significance with relation to affected apportioning valve operation must be claimed for a patent to be considered as an original classification in this subclass.

9.72 Having multiple pistons affecting fluid flow:

This subclass is indented under subclass 9.62. Subject matter wherein the means for varying the fluid flow includes plural fluid propelling shafts to the fluid pressure operated motors.

9.73 Having significant output feature:

This subclass is indented under subclass 9.62. Subject matter wherein the means for varying the fluid flow includes means for importantly affecting the flow to a fluid pressure operated motor.

9.74 Multiple outlets:

This subclass is indented under subclass 9.73. Subject matter having plural means for importantly affecting the flow.

9.75 Detail:

This subclass is indented under subclass 9.62. Subject matter wherein significance is attributed to a specific component of a fluid distribution system.

(1) Note. Included herein are control valve and system features relating to linkages, seals, springs and other parts of special importance.

- 9.76 Spring operated motor:**
This subclass is indented under subclass 6.01. Subject matter wherein one of the motors includes a resilient component working in opposition to the fluid pressure of the motor.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
71, for fluid pressure retracting systems often used with spring operated motors.
- SEE OR SEARCH CLASS:
188, Brakes, particularly subclass 170 for spring applied, fluid pressure released brakes, per se.
- 10** The fluid-distribution system is combined with a pump for accumulating a supply for use of the system.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
116.1+, for anti-lock brake system pump with a solenoid valve.
- SEE OR SEARCH CLASS:
417, Pumps, for pumps, per se.
- 11** The action of the pump is controlled by the pressure of the fluid pumped up.
- SEE OR SEARCH CLASS:
417, Pumps, subclasses 1+ for condition responsive control of a pump drive motor and 279+ for condition responsive pumped fluid control.
- 12** The system includes devices for creating a partial vacuum.
- SEE OR SEARCH CLASS:
417, Pumps, subclasses 151+ for jet pumps.
- 13** The distribution of the fluid is controlled by a plurality of means.
- 14** Devices in which, while there is a plurality of means for controlling the distribution of the fluid, when the system is in operation the control is assumed by one, the others being suppressed.
- 15** The distribution of the fluid is controlled by change of pressure in the control-pipe and by electric operation of the distributing-valves.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
3, for a fluid and electric distribution system.
121+, for a speed controlled braking system that controls fluid braking pressure.
- 16** The electric valves are operated to reduce the pressure in the control-pipe, and thus give an automatic operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
28, for the use of the word "automatic"..
- 17** Upon the initiation of distribution at the first unit, a circuit is closed to continue the action electrically on other units. A current-generator may be operated upon the initial action to furnish current for the subsequent actions on other units.
- 18** Control of system of distribution by appliances outside of and not forming part of the system.
- SEE OR SEARCH CLASS:
246, Railway Switches and Signals, particularly subclasses 167+.
- 19** Distribution of the fluid is initiated upon some failure of the operator.
- SEE OR SEARCH CLASS:
180, Motor Vehicles, subclasses 272+ for a motor vehicle provided with safety-promoting means which is responsive to the incapacity or absence of its operator.
- 20** The distribution is controlled electrically.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
121+, for and electric speed control brake system.

22.1 LOAD CONTROL:

This subclass is indented under the class definition. Subject matter wherein int distribution of fluid to the brake motors of a machine, e.g., a vehicle, is regulated by means which responds to the weight of a gravity loading on the machine.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

9.69, for a load responsive type apportioning control.

22.2 Empty and load type:

This subclass is indented under subclass 22.1. Subject matter wherein the regulating means responds in one manner of the machine does not have a gravity loading on it and in a different manner in the presence of a such a loading.

22.3 Alterable for different classes of service:

This subclass is indented under subclass 22.2. Subject matter wherein the regulating means is capable of being changed so that it may be used for another type of application e.g., used on a passenger a high speed express, or a freight type vehicle.

22.4 Failure responsive:

This subclass is indented under subclass 22.1. Subject matter including a feature which functions when the distribution of fluid ceases to occur properly.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

84.1+, for flow retarders and isolation valves which interrupt the fluid flow usually upon the failure of some part of the system.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 151+ for fluid pressure operated brakes often having safety devices.

200, Electricity: Circuit Makers and Breakers, subclasses 82+ for a fluid pressure piston which is used as an operator to open of close a circuit and often used in an automobile.

340, Communication: Electrical, subclasses 52+ for means automatically responsive to a condition of a vehicle, e.g., a brake fluid pressure monitor.

22.5 Responsive to fluid pressure spring:

This subclass is indented under subclass 22.1. Subject matter wherein the regulating means is affected by fluid pressure generated by the action of hydraulic or pneumatic suspension means used to help support the gravity loading.

22.6 Railway vehicle:

This subclass is indented under subclass 22.1. Subject matter wherein the regulating means is intended for use on a rail guided and supported conveyance.

(1) Note. While the term "railway" or similar terminology may not always be claimed, a patent is considered to be proper hereunder as an original classification of its disclosure limits it to use in a railway vehicle.

22.7 Detail:

This subclass is indented under subclass 22.6. Subject matter wherein significance is attributed to a specific component of a fluid distribution system.

(1) Note. Included herein are control valve and system features relating to linkages, seals, springs, valve structure, adjustments and other parts of special importance.

22.8 Detail:

This subclass is indented under subclass 22.1. Subject matter wherein significance is attributed to a specific component of a fluid distribution system.

(1) Note. Included herein are control valve and system features relating to linkage, seals, springs, valve structure, adjustments and other parts of special importance.

24.1 INERTIA CONTROL:

This subclass is indented under the class definition. Subject matter wherein the distribution of fluid is regulated by meas which is responsive to a resistance to acceleration, i.e., inertia.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
9.67+, for means for controlling fluid distribution by inertia in apportioning type systems.
- 25** The fluid is fed to the motor through both an automatic and a direct operation.
- (1) Note. The word “direct” is used in the sense that the fluid is fed from the control-pipe into the motor.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
28, for the use of the word “automatic”..
- 26** The fluid is fed to the motor through an automatic and a direct operation, an additional control-pipe being used.
- 27** There is both an automatic and a direct operation, the direct operation taking place upon a reduction in control-pipe pressure.
- 28** Fluid from a local source is supplied to a motor by means of a valve operated in response to a change in pressure of the fluid in the control-pipe.
- 29** Systems with supplementary control-pipe, the action being automatic with each pipe.
- 30** Automatic systems with an additional pipe connected to pressure-supply on the different units.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
5, for cases of general application in which a motor and other receptacle are supplied.
- 31** Systems in which through a change of pressure in the control-pipe the motor is operated by pressure of atmosphere in opposition to a partial vacuum.
- (1) Note. For cases in which vacuum operation is used in systems with pressure above atmospheric see this class, subclass 4.
- (2) Note. See also this class, subclass 12 for systems including devices for producing a vacuum.
- 32** The piston of the motor is held inactive between two equal pressures, the action of the motor occurring upon the expansion of compressed fluid on one side when the fluid on the other side is permitted to escape.
- 33** A valve which in one position connects the control-pipe to the auxiliary reservoir and the motor to atmosphere and which upon reduction of pressure in the control-pipe connects the auxiliary reservoir to the motor.
- (1) Note. The devices included in this subclass are what are known as “plain triple valves”. Equalizing-valves having functions in addition to those just enumerated will be found under various headings implying the nature of these functions.
- 34** A valve in which a diaphragm moving upon the rise and fall of pressure in the control-pipe operates a rotary valve to perform the equalizing-valve functions, as set forth in the preceding subclass.
- (1) Note. These valve structures may have functions in addition to those of the plain triple type, in which case the patents will be cross-referenced into the appropriate subclass.
- 35** Devices to effect a simultaneous application of fluid to the motors of a series similarly related to the control-pipe.
- 36** Devices to effect the simultaneous release of fluid from the motors in a series similarly related to the control-pipe.
- 37** Devices designed to produce a simultaneous application of fluid to the motors of a series, the method being to secure a momentary exhaust of fluid from the control-pipe to the atmosphere through each equalizing-valve as the control-pipe pressure is lowered for an emergency operation.
- (1) Note. Consult this class, subclass 82 for other devices for momentary exhaust of

- control-pipe fluid upon sudden lowering of pressure.
- 38** Devices designed to produce a simultaneous application of fluid to the motors of a series, the method being to secure a momentary exhaust of fluid from the control-pipe through the equalizing-valve as the control-pipe pressure is lowered for a service operation.
- 39** Upon lowering the pressure in the control-pipe the fluid exhausts into a closed chamber.
- (1) Note. The chamber may be and usually is the motor-chamber. This chamber is usually at atmospheric pressure at the beginning of the operation.
- 40** A valve having a diaphragm to be moved by increasing fluid-pressure to connect a source of pressure to a motor.
- (1) Note. The fluid-pressure to move the diaphragm is usually supplied by the operation of an equalizing-valve.
- SEE OR SEARCH CLASS:
137, Fluid Handling, subclass 627.5 for system including closing and opening alternately seating floe controllers.
- 41** Devices for counteracting the effects of unauthorized valve movements due to slight variations in control-pipe pressure.
- 42** Devices for preventing an undesired emergency operation of an equalizing-valve after a series of slight reductions in control-pipe pressure.
- 43** Devices to assure production of emergency operation regardless of the extent of previous service operations.
- 44** Devices operating to obtain additional pressure in the motor after equalization for an ordinary series of service operations.
- 45** Devices for moving the equalizing-valve main piston by means other than the usual unbalancing of pressures in control-pipe and local supply. The purpose is usually to move the piston to release position when stuck.
- 46** Provisions for further supply of fluid to the motor through the equalizing-valve to reinforce or supplement the auxiliary reservoir.
- (1) Note. See this class, subclass 85 for examples of supplementary reservoirs for various purposes.
- 47** The motors in a train are charged beginning with the rear end.
- 48** Systems in which the motor is fed from the supply of fluid in the control-pipe upon an increase of pressure in the control-pipe.
- SEE OR SEARCH CLASS:
188, Brakes, subclass 151 for fluid-pressure-operated brakes, and 152+ and 154 for fluid-pressure brakes adapted to use on a motor-vehicle.
- 49** Direct systems in which a liquid column is interposed between the impelling power and the motor.
- 50** Valves operated directly by a the motorman adapted to connect the source of fluid-supply to the motor.
- 51** Valves placed in the control-pipe and adapted to be operated by some one other than the motorman.
- 52** Motorman's valves adapted to connect the fluid-supply to a plurality of motors, usually differently related to the distributing agency.
- 53** Motorman's valves for controlling motors differently situated with respect to a plurality of train-sections.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
7, for systems of this type.
- 54** Motorman's valves adapted to cut off the flow when the outlet-pressure reaches a certain value.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
59,

- 55** Motorman's valves in which a diaphragm is balanced by opposing pressures, the valve containing means for modifying the relation of the opposing pressures to permit the control-pipe pressure to reduce to any desired point.
- 56** Elementary parts.
- 57** Devices for rendering available for use fluid at more than one pressure.
- 58** The fluid after being used in one portion of the apparatus is conveyed into another portion before being permitted to exhaust into the atmosphere.
- 59** Charging devices adapted to cut off the flow of fluid when the outlet-pressure reaches a certain valve.
- (1) Note. Search this class, subclass 54 for motorman's valves having this feature.
- SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 505+ for fluid pressure regulators, per se.
- 60** Charging devices adapted to cut off the flow of fluid when the outlet-pressure reaches a certain valve, but to continue the charging when the outlet-pressure falls.
- 61** Parts of the system are charged with fluid in impulses.
- 62** After the initial charge the further charging of the motor with fluid is determined by the motor movement.
- SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 358+ for expansible chamber motors having feedback control.
- 63** Upon a reduction of pressure in the system to a point which may endanger control devices act to charge the motor.
- SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 70 for analogous devices in which the same conditions result in a signal being given.
- 64** Means in addition to the usual leak-in groove for charging the auxiliary reservoir.
- (1) Note. This subclass contains patents in which the movement of the equalizing-valve to application position is caused by the increase of auxiliary-reservoir pressure.
- 65** Means for charging the auxiliary reservoir without releasing the motor.
- 66** Means for charging the brake-pipe with fluid.
- (1) Note. These devices are usually directed to reinforcing the pipe-pressure at one or more places along the line for the purpose of accelerating release of the motor.
- 67** Means for preventing the undesirable charging of the brake-pipe.
- 68** Means for releasing fluid-pressure from the motor.
- 69** Means for securing rapid release of the motor, usually through other than the regular channels.
- 70** Means for releasing the motor by venting fluid from the auxiliary reservoir, and thus permitting the equalizing-valve to move to release position.
- 71** The motor is forced to release position by the pressure of fluid.
- SEE OR SEARCH CLASS:
188, Brakes, subclass 170 for fluid pressure release of spring applied brakes and see the search notes thereunder.
- 72** Release of motor is retarded.
- 73** The motor is partially released through a loaded valve that permits a more or less slow reduction of pressure.
- 74** Means for repeatedly placing the equalizing-valve in release position, then returning it to lap or blanked position, in this way releasing the motor by steps.

75 Devices for preventing the release of the motor.

- (1) Note. These are known as “pressure-retainers”.

76 Devices for preventing the release of the motor by means of the manipulation of a valve under the control of the motorman.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8, for other patents having this type of release-preventers.

77 The release of the motor is prevented by a valve responsive to changes of pressure in the brake-pipe.

78 The release of the motor is prevented by a valve responsive to changes in pressure in the auxiliary reservoir.

79 The release of the motor is prevented by a valve loaded by means of a spring or a weight.

80 Means for releasing fluid-pressure from the auxiliary reservoir.

81 Means for releasing fluid-pressure from the control-pipe.

- (1) Note. Devices for controlling the release to the extent of stopping it are also included in this subclass.

82 Upon a sudden fall in pipe-pressure a valve is opened to permit a momentary discharge of fluid into the external atmosphere.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 37, 38 for similar action.

83 Fluid is released from the brake-pipe into a chamber.

- (1) Note. This is comparable to the action of the equalizing-valves in this class, subclass 39.

84.1 FLOW RETARDER:

This subclass is indented under the class definition. Subject matter including means for interrupting movement of fluid as it is being distributed.

- (1) Note. The flow is usually being interrupted due to a failure of some part of the system.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, particularly subclasses 602+ for a device with multiple inlets and a single outlet for regulating fluid flow.

84.2 Isolation valve:

This subclass is indented under subclass 84.1. Subject matter wherein a specific controlling mechanism, i.e., a valve is used to cut off and separate a portion of a fluid distribution system from another portion.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 9.63, for failure responsive apportioning control of multiple motors.
63, for valves responsive to system failure and which charge a motor.

SEE OR SEARCH CLASS:

- 60, Power Plants, particularly subclass 535 for a pulsator with a failure indicator and subclasses 581 and 582 for pulsator structure that provides safety structure.
137, Fluid Handling, particularly subclasses 112+ for a valve that selects the highest inlet pressure.
188, Brakes, subclasses 151+ for fluid pressure operated brakes often having safety devices.
200, Electricity: Circuit Makers and Breakers, subclasses 82+ for a fluid pressure piston which is used as an operator to open or close a circuit and often used in a automobile.
340, Communications: Electrical, subclasses 52+ for means automatically responsive to a condition to a vehicle, e.g., a brake fluid pressure monitor.

- 85** Additional reservoirs, in most cases supplementary to the auxiliary reservoir.
- 86** Patents not otherwise classifiable for means of operating on the control-pipe.
- 87** Devices to neutralize the effects of a surge of fluid resulting from the sudden closure of a pipe under high pressure.
- SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 37+ for a device which regulates the flow of fluid to neutralize the surge of fluid.
- 89** Includes devices for maintaining parts in position of application or release.
- SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, subclasses 24+ for locking means for retaining an expansible chamber device in the operative position.
188, Brakes, subclass 265.
- 90** Valves so piped that the valve can be opened without uncoupling.
- 112** This subclass is indented under subclass 121. Apparatus wherein the braking action is regulated at least in part by means responsive to a force or combination of forces producing or tending to produce a twisting or rotating motion on a braked rotating member.
- SEE OR SEARCH CLASS:
188, Brakes, particularly subclass 181 for a vehicle torque responsive regulator.
192, Clutches and Power-Stop Control, subclass .034 for automatic interrelated power delivery controls using torque only.
- 113.1 Having a valve system responsive to a wheel lock signal:**
This subclass is indented under subclass 121. Structure wherein there is provided a fluid pressure regulator which includes at least in part a fluid passage opening or closing structure responsive to a speed deceleration (e.g., actuating a brake pedal).
- 113.2 With traction control:**
This subclass is indented under subclass 113.1. Structure wherein the system is provided with means to prevent acceleration or drive slip.
- 113.3 Including booster:**
This subclass is indented under subclass 113.2. Structure wherein the acceleration or drive slip prevention also includes a power assist device associated with a master cylinder for controlling the release and reapplication of brake pressure through an interaction with the power assist device.
- 113.4 Including a stroke sensor:**
This subclass is indented under subclass 113.1. Structure wherein a movement in a fluid pressure regulator element (e.g., a piston, brake pedal) is measured and a corresponding signal is utilized in an anti-lock control.
- 113.5 With system apportioning control:**
This subclass is indented under subclass 113.1. Structure in which the fluid in the system is monitored and distributed to correct an imbalance.
- 114.1 Including hydraulic power booster:**
This subclass is indented under subclass 113.1. Structure wherein the fluid pressure regulator cooperates with a power assist device associated with a master cylinder for controlling the release and reapplication of brake pressure through an interaction with the power assist device.
- SEE OR SEARCH CLASS:
60, Power Plants, subclass 545 for a pulsator having electrically or magnetically operated structure, subclass 561 for a pulsator having a pressure balancing free piston or a diaphragm between parallel pulsators, subclass 581 for plural structurally related master pistons, cylinders or pulsator circuits, and subclass 582 for a pulsator having a safety standby structure becoming operative due to the malfunction of a power booster system.
91, Motors: Expansible Chamber Type, subclasses 391+ for booster arrangement with alternative means of actua-

tion upon failure of the primary means of actuation.

114.2 Parallel boosters:

This subclass is indented under subclass 114.1. Structure wherein power assist devices are provided for each wheel or each set of wheels.

114.3 Including pneumatic power booster:

This subclass is indented under subclass 113.1. Structure wherein the fluid pressure regulator cooperates with a power assist device of the compressed air type that is associated with a master cylinder for controlling the release and reapplication of brake pressure through an interaction with the power assist device.

115.1 System controlled by expansible chamber type modulator:

This subclass is indented under subclass 113.1. Structure wherein the fluid pressure regulator includes a variable volume reactive device (e.g., piston and cylinder, bellows type) having a motive fluid valve to regulate the pressure of the braking fluid.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 439 for a motor having opposed working chambers and a bypass therebetween independently controlled by valve means.
- 137, Fluid Handling, subclass 625.27 for a reciprocating supply and exhaust multi-way valve unit of the plural disc or plug type and subclass 625.25 for a motor operated supply and exhaust multi-way valve unit.
- 251, Valves and Valve Actuation, subclass 25 for a fluid actuated or retarded pilot or servo type motor and subclass 61.3 for a valve between a coaxial spring biasing means and a fluid actuated flexible wall valve actuator.

115.2 Having electric control:

This subclass is indented under subclass 115.1. Apparatus wherein the motive fluid valve is governed by a component operated by electricity.

115.3 Having vacuum motor control:

This subclass is indented under subclass 115.1. Apparatus wherein the motive fluid valve is governed by a negative pressure, energy converting component.

115.4 Having pump pressure control:

This subclass is indented under subclass 115.1. Apparatus wherein the motive fluid valve is governed by a force generated by a fluid pressurizing means.

115.5 Pump pressure operates fluid motor:

This subclass is indented under subclass 115.4. Apparatus wherein the fluid pressurizing means force drives an energy converting device of the liquid or gaseous type.

115.6 Including flywheel control (e.g., motorcycle type):

This subclass is indented under subclass 115.1. Apparatus wherein the motive fluid valve is governed by a device which stores kinetic energy via mechanical inertia or momentum.

SEE OR SEARCH CLASS:

- 188, Brakes, subclasses 181+ for a speed responsive regulator located on a vehicle.

116.1 Including pump with system solenoid valve:

This subclass is indented under subclass 113.1. Apparatus wherein the fluid pressure regulator comprises an additional fluid circuit including fluid pressurizing means (e.g., pump) and at least one fluid passage opening and closing structure which responds to an electromagnetic force for modifying the pressure of the braking fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 10, for a fluid distribution system combined with a pump.

116.2 Having pressure line isolated from master cylinder line:

This subclass is indented under subclass 116.1. Apparatus in which the fluid pressurizing means fluid source is independent of the fluid source for a mutually reactive expansible chambers device that operates the brake system.

116.3 Vehicle wheel operated pump:

This subclass is indented under subclass 116.1. Structure in which the fluid pressurizing means is driven by rotation of an automobile or truck drive axle, hub, rim, and tire.

116.4 System pump structure detail:

This subclass is indented under subclass 116.1. Apparatus wherein the specific structure of the fluid pressurizing means, e.g., chamber, piston structure, cylinder structure, housing, intake (section), or output (cam, push rod) effects the system.

SEE OR SEARCH CLASS:

- 415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclasses for details to a rotary kinetic pump.
- 416, Fluid Reaction Surfaces (i.e., Impellers), appropriate subclasses for details to an impeller structure.
- 417, Pumps, appropriate subclasses for details to pump structure.

117.1 Spool valve:

This subclass is indented under subclass 113.1. Apparatus wherein the fluid pressure regulator is a sliding rod with a series of fixed pistons that open or close fluid paths.

118.1 Pneumatic (relay or motorman) type:

This subclass is indented under subclass 113.1. Apparatus wherein the fluid pressure regulator includes valve means for controlling braking pressure to admit the necessary amount of air pressure to the brakes of a vehicle or a railroad vehicle.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 40, for a valve actuated in response to a change in fluid pressure to connect a source of fluid pressure to a motor.
- 50, for a motorman valve adapted to connect a source of fluid supply to a motor.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 627.5 for systems including sequentially closing and opening alternately seating flow controllers.

119.1 System controlled by solenoid valve:

This subclass is indented under subclass 113.1. Apparatus wherein the fluid pressure regulator includes at least one fluid passage opening and closing structure which responds to an electromagnetic force.

SEE OR SEARCH CLASS:

- 251, Valves and Valve Actuation, subclasses 30.01+ for an electromagnetically actuated pilot or auxiliary valve for controlling a main valve, subclasses 129.01+ for an electrical actuator.

119.2 System solenoid valve detail:

This subclass is indented under subclass 119.1. Apparatus in which the specific structure of the electromagnetically operated fluid pressure regulator, e.g., number of paths or passageways, coil, electrical contacts, armature effects the system.

119.3 Housing for plural solenoids:

This subclass is indented under subclass 119.1. System solenoid valve in which a single container holds at least two electromagnetic actuators.

121 Speed-controlled:

This subclass is indented under the class definition. Subject matter wherein the braking fluid and therefore the braking action is regulated by velocity.

- (1) Note. A speed condition can be, for example, a velocity signal from a single wheel or plural wheels, or a velocity signal from a vehicle body.
- (2) Note. Included in this subclass are the following: a positive rate-of-change of velocity (acceleration) from a wheel or plural wheels; a negative rate-of-change of velocity (deceleration) from a wheel or plural wheels; an acceleration from a vehicle body; or a deceleration from a vehicle body.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 488+ for measuring and testing speed or acceleration, subclass 495 for

- speed or acceleration diverse condition indicating, and subclass 509, for speed or acceleration with response to a nonspeed condition.
- 116, Signals and Indicators, subclass 57 for devices to indicate when a predetermined speed is reached.
- 188, Brakes, subclasses 180+ for the regulation of vehicle brakes (nonfluid pressure) in response to speed changes.
- 192, Clutches and Power-Stop Control, subclass 103 for interrelated power delivery speed automatic control.
- 246, Railway Switches and Signals, subclass 182 for speed control systems, and especially for automatic vehicle-carried braking and speed comparison circuits respectively.
- 307, Electrical Transmission or Interconnection Systems, subclass 10.1 for automobile mounted systems.
- 340, Communications: Electrical, subclass 441 for alarms or indicators which respond to vehicle speed and may also respond to variations in the pressure within a hydraulic brake system.
- 361, Electricity: Electrical Systems and Devices, subclasses 236+ for electrical speed signal processing systems.
- 477, Interrelated Power Delivery Controls, Including Engine Control, subclass 40 for using an engine transmission control with brake control to slow a vehicle and subclasses 182+ for an engine brake control to slow a vehicle.
- 701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 70 for indication or control of braking, acceleration, or deceleration; subclasses 71+ and 82+ for processing or calculating a parameter used to determine antiskid, antilock, or antispin.
- 122 With failure responsive means:**
This subclass is indented under subclass 121. Speed control provided with means for detecting faulty operation of a speed control regulator and means for overriding a speed condition regulator.
- (1) Note. This subclass includes systems which cycle the speed responsive control means in response to a simulated speed condition to thereby check for the proper operation of the speed responsive means and also includes means for monitoring various components of a speed responsive control means to detect any failure thereof.
- SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 453+ for communication automatically responsive to a brake condition, and subclass 515 for testing of an automatically responsive system by simulation of condition.
- 122.01 Traction failure:**
This subclass is indented under subclass 122. Speed control with failure response in which the response is to a tire-road contact area less than needed for efficient forward motion.
- 122.02 Antilock failure with warning:**
This subclass is indented under subclass 122. Speed control with failure response in which wheel slip control faulty operation is indicated to a vehicle driver.
- 122.03 Failure related to brake condition (e.g., wear, sensor or switch operation) with indicator:**
This subclass is indented under subclass 122. Speed control with failure response in which the faulty operation and the state of the wheel rotation retarding or halting device is detected and signaled to the vehicle operator.
- 122.04 Electric system failure(no warning):**
This subclass is indented under subclass 122. Speed control with failure response in which the faulty operation is due to deenergization.
- 122.05 Electronic or electric component (e.g., speed detector, failure sensing) with warning:**
This subclass is indented under subclass 122.04. Speed control with electric failure response in which the faulty operation of an energized element; e.g., rate sensor, is detected and indicated to a vehicle operator.
- 122.06 ABS failure detected via time period of sensed wheel lock or wheel speed signal:**
This subclass is indented under subclass 122. Speed control with failure response in which the faulty operation occurs during an interval

when braking torque is maximum or ground engaging member rate is high.

122.07 Time signal error (no warning):

This subclass is indented under subclass 122. Speed control with failure response in which the faulty operation is detected during an interval where monitoring circuits are no longer consistent; e.g., the wheel speed is sampled and compared to a previous speed (i.e., no deceleration) or a predetermined limit.

122.08 Active circuit testing:

This subclass is indented under subclass 122. Speed control with failure response in which, prior to the braking action, a predetermined condition is used to check or analyze a skid control system (sensors, regulator, electrical components, etc.) to ensure proper operation.

122.09 Pressure failure:

This subclass is indented under subclass 122. Speed control with failure response in which the faulty operation is due to loss of a compressed fluid.

122.1 With warning:

This subclass is indented under subclass 122.09. Pressure failure in which the faulty operation is indicated to a vehicle operator.

122.11 Detected via stroke sensor:

This subclass is indented under subclass 122.09. Pressure failure in which the faulty operation is during movement of the master cylinder pistons.

122.12 Pump failure detection:

This subclass is indented under subclass 122.08. Pressure failure in which the faulty operation of a compressed fluid moving means is sensed.

122.13 Auxiliary pressure failure:

This subclass is indented under subclass 122.08. Pressure failure in which the faulty operation of a backup system, used in case of a failure or malfunction of a main hydraulic pressure system, is sensed.

122.14 With warning:

This subclass is indented under subclass 122.13. Auxiliary pressure failure in which the faulty operation is indicated to a vehicle operator.

122.15 Pneumatic:

This subclass is indented under subclass 122.08. Pressure failure in which the faulty operation is in a system using gas; e.g., air.

123 For a tractor-trailer type vehicle:

This subclass is indented under subclass 121. Speed control for a conveyance comprising towing means coupled to a freight carrier by a towing link.

124 Electric brake:

This subclass is indented under subclass 123. Tractor trailer speed control in which motion is retarded or halted by an energized via application of a current and a voltage system.

125 Automatic braking including speed governor or hydraulic retarder:

This subclass is indented under subclass 121. Speed control in which upon detection of excessive vehicle rate, the braking action occurs without initiation of the operator.

126 Aircraft:

This subclass is indented under subclass 125. Automatic braking in which the speed control is for a machine or structure adapted to be completely or partially sustained by the air.

127 Pneumatic:

This subclass is indented under subclass 121. Speed control in a system using a gas; e.g., air:

128 For a railway vehicle (e.g., train):

This subclass is indented under subclass 127. Pneumatic speed control for a conveyance which rides on a predetermined path; e.g., track.

129 With speed governor (hydraulic or inertia):

This subclass is indented under subclass 128. Train speed control in which the velocity of the conveyance is regulated by a system using a pressurized liquid medium or by a system responsive to a change of motion.

- 130 Compared to fixed reference:**
This subclass is indented under subclass 129. Train speed control with governor in which the velocity is contrasting an actual parameter; e.g., speed, acceleration, with a previously defined parameter.
- 131 Plural similar inputs:**
This subclass is indented under subclass 128. Train speed control in which at least two of the same condition; e.g., speeds of at least two wheels, determine the subsequent braking action.
- 132 Speed responsive and other conditions (e.g., acceleration, pressure, track hazard, friction):**
This subclass is indented under subclass 128. Train speed control in which the rate and an additional input determine subsequent braking action.
- 133 Traction control:**
This subclass is indented under subclass 128. Train speed control in which the braking action is affected by wheel skid.
- 134 Compared to fixed reference:**
This subclass is indented under subclass 128. Train speed control in which the velocity is contrasting an actual parameter; e.g., speed, acceleration with a previously defined parameter.
- 135 Automatic:**
This subclass is indented under subclass 128. Train speed control in which the braking action is applied without direct action by the operator.
- 136 Pseudo-speed:**
This subclass is indented under subclass 128. Train speed control in which the braking action is controlled by a rate determined from the difference between wheel and vehicle speeds.
- 137 Motorcycle:**
This subclass is indented under subclass 121. Speed control for a two-wheeled motorized vehicle.
- 138 Speed, deceleration, or ABS indication:**
This subclass is indented under subclass 121. Speed control in which a rate of vehicle travel, decreasing rate per time, or wheel slip is brought to the attention of a vehicle operator via a lamp, recorder, etc.
- 139 And traction control:**
This subclass is indented under subclass 121. Speed control in which the braking action is regulated by a reaction to skidding.
- 140 With yaw control:**
This subclass is indented under subclass 139. Speed and traction control including a vehicle side-to-side movement or angular motion about a vehicle vertical axis regulator.
- 141 With engine torque power take-off (PTO) control:**
This subclass is indented under subclass 139. Speed and traction control including a vehicle motor force producing rotation regulator.
- 142 Motor control:**
This subclass is indented under subclass 139. Speed and traction control including a vehicle engine force to provide braking action.
- 143 With four wheel drive or all wheel drive:**
This subclass is indented under subclass 139. Speed and traction control in which the braking action is designed for a vehicle with a differential for each axle.
- 144 Intersecting traction and skid occurrence:**
This subclass is indented under subclass 139. Speed and traction control in which a control unit compensates for a succession of a slip and spin condition.
- 145 Odd condition (e.g., fuel supply cut-off, modulating valve):**
This subclass is indented under subclass 139. Speed and traction control in which the braking action is controlled by an additional parameter different from the usual condition of acceleration or pressure.

- 146 With yaw control:**
This subclass is indented under subclass 121. Speed control in which the braking action is controlled by a vehicle side to side movement or angular motion about a vehicle vertical axis.
- (1) Note. Yaw control in which the braking action is controlled by conditions detected related to; e.g., geometry, force, friction is classified here.
- 147 From speed sensors:**
This subclass is indented under subclass 146. Yaw control in which the braking action is controlled by conditions detected related to rate.
- 148 From split coefficient of friction (μ):**
This subclass is indented under subclass 146. Yaw control in which the braking action is controlled by detection of a low to high road-tire resistance.
- 149 Split coefficient of friction (μ):**
This subclass is indented under subclass 121. Speed control with failure response in which the braking action is controlled by detection of a low to high road-tire resistance based on wheel deceleration versus a reference deceleration.
- 150 Specific μ determination:**
This subclass is indented under subclass 121. Speed control in which the braking action is determined from the tire to road contact force.
- 151 Traction-motor vehicle:**
This subclass is indented under subclass 121. Speed control in which an electric to mechanical energy converter is conditioned during the braking action to operate as a generator thereby permitting recapture of the kinetic energy during the braking action.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
149, for regenerative brakes.
- 152 Regenerative brakes:**
This subclass is indented under subclass 121. Speed control in which a hydraulic motor normally driving the vehicle is conditioned during the braking action to operate as a generator thereby permitting recapture of the vehicle's kinetic energy during the braking action.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
148, for traction-motor vehicle brakes.
- 153 Lead signal control for antiskid:**
This subclass is indented under subclass 121. Speed control in which a network responsive to a time derivative pulse of the braking action reacts to alter steering.
- 154 Multiple control signal with multiple threshold:**
This subclass is indented under subclass 121. Speed control in which the braking action is determined from more than one input; e.g., large spin-up rate, a small wheel speed versus car deviation, wheel speed, vehicle speed, slip, deceleration, coefficient of friction, having more than one limit condition, reference, or value.
- 155 Braking pressure demand or braking force desire:**
This subclass is indented under subclass 121. Speed control in which the braking action is (a) controlled by a response of an operator; i.e., force applied to the brake pedal or (b) is equalized throughout a system; e.g., front or rear brakes adjusted to supply more braking depending on sensed parameters such as wheel speed.
- 156 Pulse frequency or time period controlling pressure rebuild:**
This subclass is indented under subclass 121. Speed control in which after the braking action is applied, a burst of electrical energy or an interval determines a force for braking being restored.
- 157 Pressure release control:**
This subclass is indented under subclass 121. Speed control wherein an output signal from a deceleration detecting means operates to reduce a braking force.
- 158 Pressure reapply control:**
This subclass is indented under subclass 121. Speed control in which conditions; e.g., wheel velocity, vehicle acceleration, coefficient of friction, monitored during the braking action

- are evaluated to determine either control of the braking fluid force.
- 159 Wheel pressure delay compared to reference:**
This subclass is indented under subclass 121. Speed control in which release or reapplication of braking force is held back relative to a determined release or reapplication control signal.
- 160 Pressure or specific condition (e.g., deceleration) determines wheel speed instead of direct speed sensor:**
This subclass is indented under subclass 121. Speed control in which the rate of a road engaging member of a typical vehicle is found by changes in, for example, a compressed fluid system, rate per time change, vehicle rate, displacement, coefficient of friction, to decide braking action.
- 161 Current or voltage ramp proportional to vehicle speed:**
This subclass is indented under subclass 121. Speed control in which the braking action is dependent upon stepping the amperage or electric potential to rotate a brake motor to assure a smooth increase in force.
- 162 Current control of linear piston drive motor:**
This subclass is indented under subclass 121. Speed control in which the braking action is dependent upon an amperage put out by an electrical power generating device.
- 163 Slip ratio:**
This subclass is indented under subclass 121. Speed control in which the braking action is subsequently determined from a dimensionless number using the equation, vehicle speed minus wheel speed then divided by vehicle speed (at the time of brake impartation).
- 164 Slip time versus nonslip time:**
This subclass is indented under subclass 121. Speed control in which the braking action is based on a relationship between a wheel spin (slip ratio) time versus a time when no wheel spin occurs.
- 165 Variable target slip values:**
This subclass is indented under subclass 121. Speed control in which the braking action is affected by comparing a wheel spin or slippage threshold with detection of an actual wheel spin and altering the threshold for the spin detected.
- 166 Wheel speed sensor and braking pressure sensor:**
This subclass is indented under subclass 121. Speed control in which both the detection of rate of a road engaging member of a typical vehicle and detection of a compressed fluid decides the braking action force.
- 167 Brake force or pressure determined from speed sensors:**
This subclass is indented under subclass 121. Speed control in which the compressed braking fluid is regulated by a measurement of a rate of the wheel or the vehicle.
- 168 Wheel generated pulse signal control (speed sensor):**
This subclass is indented under subclass 121. Speed control in which detection of a rotating road engaging member by a magnetic or optical pick-up element, or a tachometer-type device, makes an electrical wave that is processed to determine braking action.
- SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 488+ for speed sensor construction.
- 169 Left or right speed comparison:**
This subclass is indented under subclass 121. Speed control in which the braking action is determined by contrasting a driver's side wheel rate to a passenger's side wheel rate.
- 170 Select high wheel speed versus select low:**
This subclass is indented under subclass 121. Speed control in which the rate of rotation is compared and the braking action determined from a maximum or minimum rate.
- 171 Wheel speed versus pseudo vehicle speed (e.g., from deceleration):**
This subclass is indented under subclass 121. Speed control in which the braking action is influenced by a road engaging member rate

- exceeding a reference value of a conveyance rate.
- 172 By direct feedback or instant wheel control:**
This subclass is indented under subclass 171. Speed control in which the braking action is affected by a road engaging member rate exceeding a conveyance rate found by inputs from the road engaging member rate.
- 173 By comparison of plural wheel speeds:**
This subclass is indented under subclass 171. Speed control in which the braking action is altered by a fastest rate of a road engaging member exceeding a reference value of a conveyance rate found by a rate of road engaging members slower than the fastest rate.
- 174 Previously stored wheel speed information:**
This subclass is indented under subclass 121. Speed control in which the braking action is controlled by comparing a value of the road engaging member velocity held in a memory to the instantaneous velocity.
- 175 Incipient or imminent skid measured:**
This subclass is indented under subclass 121. Speed control in which the braking action is regulated by a condition of apparent or impending loss of traction of one wheel; e.g., front wheel, by rotating at a higher circumferential speed than another wheel on the same axle.
- 176 Antilock control disabled or altered for acceleration or speed ranges:**
This subclass is indented under subclass 121. Speed control in which a wheel slip correction system is temporarily deactivated or changed for a predetermined rate per time or rate limits.
- 177 Sensing jerk, acceleration, or deceleration:**
This subclass is indented under subclass 121. Speed control in which the braking action is determined from a first derivative of speed or by a system responsive to a change of rate per time motion.
- 178 Wheel deceleration to find velocity error:**
This subclass is indented under subclass 177. Sensing acceleration in which a road engaging member rate per time circuit produces a reference signal which is a function of a difference or inaccuracy between a road engaging member rate and a rate which is a function of the signal.
- 179 Rotary and linear inertia:**
This subclass is indented under subclass 177. Sensing acceleration in which an eccentric mass both rotates about an axis and reciprocates along the same axis.
- 180 Rotary inertia:**
This subclass is indented under subclass 177. Sensing acceleration in which an eccentric mass rotates about an axis.
- 181 Linear inertia or accelerometer (includes pendulum type):**
This subclass is indented under subclass 177. Sensing acceleration in which an eccentric mass reciprocates along an axis.
- 182 Accelerometer versus wheel rotation sensor:**
This subclass is indented under subclass 177. Sensing acceleration in which a road engaging member rate of turning is measured and compared to a rate per time.
- 183 Specific acceleration or deceleration determined electronically:**
This subclass is indented under subclass 177. Sensing acceleration wherein rate per time is found by a circuit which then controls braking action.
- 184 Acceleration-deceleration versus timing:**
This subclass is indented under subclass 177. Sensing acceleration in which the rate per time parameter compared to a specific interval controls braking action.
- 185 Sensing deceleration then acceleration:**
This subclass is indented under subclass 177. Sensing acceleration wherein the braking fluid is regulated to allow for a brake release in response to negative rate of change or velocity followed by a brake reapplication in accordance with a positive rate of change of velocity.
- 186 Front-rear axle apportioning or speed difference:**
This subclass is indented under subclass 121. Speed control in which the braking fluid of the steerable wheels and the back wheels is distributed according to the rotational rate.

- 187 Diagonal wheels apportioning arrangement:**
This subclass is indented under subclass 121. Speed control in which the braking fluid for a right front wheel is operatively connected to a left rear wheel, etc.
- 188 All wheel apportioning arrangement (e.g., cross coupling):**
This subclass is indented under subclass 121. Speed control in which the braking fluid for each road engaging member is operatively connected.
- 189 Independent control for each wheel:**
This subclass is indented under subclass 121. Speed control in which a separate and distinct braking action to every road engaging member of a typical vehicle is regulated.
- 190 Four-wheel drive or all wheel drive:**
This subclass is indented under subclass 121. Speed control wherein the braking action is designed for a vehicle with a differential for each axle.
- 191 Odd condition or device detection (e.g., fluid or brake temperature, hill holder, anti-squeal controller, acoustic emission):**
This subclass is indented under subclass 121. Speed control in which the braking action is controlled by an additional parameter different from the usual condition of acceleration or pressure.
- 192 Vehicle inclination:**
This subclass is indented under subclass 191. Odd condition in which the braking action is influenced by a slope of an automobile, truck, etc.
- 193 With sonar or radar type sensor:**
This subclass is indented under subclass 191. Odd condition in which the rate (or an obstruction) is found by a detector that operates in the (a) sonic or supersonic range, or (b) ultrahigh frequency or microwave part of the radio spectrum range.
- 194 Hop or bounce (from vibration or oscillation) signal:**
This subclass is indented under subclass 191. Odd condition in which high or low amplitude pulses, produced by a wheel going over an obstruction or falling into a hole, are detected during braking action.
- 195 Spurious signal:**
This subclass is indented under subclass 191. Odd condition in which pulses outside a specific amplitude or frequency (or both) are detected during braking action.
- 196 For rough road:**
This subclass is indented under subclass 195. Spurious signal in which the pulses are created by a driving surface containing irregularities such as potholes, speed bumps, etc.
- 197 With feeler wheel:**
This subclass is indented under subclass 191. Odd condition in which the braking action is determined from a road engaging member independent from the vehicle road engaging members.
- 198 Speed and vehicle load condition (e.g., cargo):**
This subclass is indented under subclass 191. Odd condition wherein the braking fluid is regulated by velocity and additional weight due to freight, extra passengers, etc.
- 199 Electric control circuit detail:**
This subclass is indented under subclass 121. Speed control which specifies a component (e.g., resistor, capacitor, diode) of a system that generates the signals for operation.

CROSS-REFERENCE ART COLLECTIONS

- 900 ABS throttle control:**
This subclass is indented under the class definition. Structure wherein the anti-lock brake system includes a flow restriction of the brake fluid in the system.
- 901 ABS check valve detail:**
This subclass is indented under the class definition. Structure wherein the anti-lock brake system includes the particular elements of a preset fluid regulating device which restricts flow in one direction.

END