

CLASS 477, INTERRELATED POWER DELIVERY CONTROLS, INCLUDING ENGINE CONTROL

SECTION I - CLASS DEFINITION

This is the class for structure wherein operation of an engine* either regulates or is regulated by the operation of a clutch*, a gear transmission*, or a brake*.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

This class was formed from patents in previously existing Classes 74 and 192 related to interrelated controls between an engine and a transmission, clutch, or brake. Therefore the line between this and other classes is the same as between Class 74 and Class 192 and other classes.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

- 60, Power Plants, especially subclasses 347+ and 445+ for interrelated control between a motor and a device of Class 60.
- 74, Machine Element or Mechanism, for gearing, per se, and for control for gearing lacking interrelated motor control.
- 123, Internal-Combustion Engines, subclasses 319+ for devices to regulate engine speed in an internal combustion engine.
- 180, Motor Vehicles, for interrelated control between an engine and a transmission, clutch, or brake, and also including significant vehicle structure.
- 188, Brakes, for brakes, per se.
- 192, Clutches and Power-Stop Control, for clutches and clutch operators.
- 318, Electricity: Motive Power Systems, especially subclasses 3+ for the combination of a significant electrical motor and a load device; and see the Class Definition, Load Device Driven By The Motor (Including Power, Motion, Force, or Torque Transmitting Devices) for a statement of the line between the classes.
- 474, Endless Belt Power Transmission Systems or Components, for endless belt transmissions and control therefore, but lacking interrelated motor control.

- 475, Planetary Gear Transmission Systems or Components, for planetary gear transmissions and control therefore, but lacking interrelated motor control.
- 476, Friction Gear Transmission Systems or Components, for friction gear transmissions and control therefore, but lacking interrelated motor control.
- 701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission control structure.

SECTION IV - GLOSSARY

The following glossary will define words or phrases used in the class and subclass definitions and are identified by an asterisk which appears after the word, or in the instance of a phrase, after the last word of the phrase:

BRAKE:

Mechanism operable to stop a rotatable part with respect to a stationary part. If a brake is used as a part of transmission (i.e., in a planetary transmission to change gear ratio or direction), such a brake is classified with transmission control rather than brake control.

CLUTCH:

Mechanism operable to couple two relatively rotatable parts together for common rotation or to uncouple such parts. The clutch* as used in the definition of this class or subclasses is a clutch* that may be used without a gear transmission* or in advance of or behind a gear transmission* in a power train. If a clutch is used as a part of transmission (i.e., in a planetary transmission to change gear ratio or direction), such a clutch is classified with transmission control rather than clutch control.

ENGINE:

A primary source of rotational energy.

GEARING POWER PATH:

Mechanism including relatively rotatable bodies having engaging surfaces or which are drivingly connected by a belt or chain whereby a rotatable body will impart to or receive rotary motion or power from another rotary body by rolling contact.

GEAR TRANSMISSION:

Mechanism including at least one gearing power path*, said mechanism being capable of changing the speed ratio* or rotational direction between a mechanical output of an engine* and a load*.

INPUT SHAFT:

Mechanism that receives rotational motion from an engine* and transfers such motion to a gear transmission* or to a clutch*.

LOAD:

Mechanism that receives rotational motion from a gear transmission* or clutch* to do useful work.

OUTPUT SHAFT:

Mechanism that receives rotational motion from a gear transmission* or clutch* and transfers such motion to a load*.

SPEED RATIO:

Rotational velocity of an output shaft* divided by the rotational velocity of an input shaft*.

SUBCLASSES

1 STEERING BY DRIVING:
This subclass is indented under the class definition. Subject matter wherein a gear transmission* is provided to drive parallel vehicle wheels at different relative speeds to effect turning of the vehicle and such means either regulates or is regulated by an engine*.

SEE OR SEARCH CLASS:

180, Motor Vehicles, subclasses 6.2+ for steering by driving combined with significant vehicle structure.
475, Planetary Gear Transmission Systems or Components, subclasses 18+ for gearing of that type used for steering by driving.

2 PLURAL ENGINES:
This subclass is indented under the class definition. Subject matter wherein more than one engine* is effective to regulate or be regulated.

SEE OR SEARCH CLASS:

180, Motor Vehicles, subclass 69.6 for plural power plants specifically arranged on a vehicle frame.

3 Electric engine:
This subclass is indented under subclass 2. Subject matter wherein one of the engines* is electrically powered.

4 With brake control:
This subclass is indented under subclass 3. Subject matter wherein means is provided to regulate the operation of a brake*, and such regulation is interrelated with that of an engine*.

5 With clutch control:
This subclass is indented under subclass 3. Subject matter wherein means is provided to regulate the operation of a clutch* and such regulation is interrelated with that of an engine*.

6 With clutch control:
This subclass is indented under subclass 2. Subject matter wherein means is provided to regulate the operation of a clutch* and such regulation is interrelated with that of an engine*.

7 ELECTRIC ENGINE:
This subclass is indented under the class definition. Subject matter wherein the engine* is electrically powered.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3, for plural engines, one or both of which may be electric.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, subclasses 9+ for the combination of electric motor and motion or power transmitting mechanism driven thereby. See section I,E,6, of the main class definition of Class 318 for a statement of the line.

- 8 With clutch control:**
This subclass is indented under subclass 7. Subject matter wherein means are provided to regulate a clutch* and such means affects or is affected by the engine* operation.
- 9 With brake control:**
This subclass is indented under subclass 8. Subject matter wherein a means to apply a brake* is provided and such means affects or is affected by the engine* or clutch* control.
- 10 Stopped at end of cycle:**
This subclass is indented under subclass 9. Subject matter wherein a load* device is automatically halted after a predetermined amount of movement.
- 11 Engine stopped at end of cycle:**
This subclass is indented under subclass 8. Subject matter wherein the power to the engine* is automatically disconnected after a predetermined amount of motion.
- 12 Common controller:**
This subclass is indented under subclass 8. Subject matter wherein the engine* and clutch* are operated by a single actuator.
- 13 Electric clutch:**
This subclass is indented under subclass 8. Subject matter wherein the clutch* is activated by electrical means.
- 14 Speed responsive:**
This subclass is indented under subclass 8. Subject matter wherein the regulation is affected by the velocity of a rotary part.
- 15 With transmission control:**
This subclass is indented under subclass 7. Subject matter wherein the electric engine* is connected to a load* through a gear transmission* and the operation of the gear transmission* regulates or is regulated by the operation of the engine.
- 16 Load motion limit control:**
This subclass is indented under subclass 15. Subject matter wherein the regulation of the engine* or gear transmission* takes place as the load* reaches a predetermined position.
- 17 Transmission change by moving engine.**
This subclass is indented under subclass 15. Subject matter wherein the gear transmission* is regulated by changing the position of the engine* with relation to its support.
- 18 Reversible engine:**
This subclass is indented under subclass 15. Subject matter wherein the regulation of the engine* includes changing the direction of rotation of a shaft driven by the engine.
- SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclass 810.1 for a reversible motor effective to change the power path of a transmission.
475, Planetary Gear Transmission Systems or Components, subclass 12 for a reversible motor effective to change the power path of a planetary transmission.
- 19 Engine starting interlock:**
This subclass is indented under subclass 15. Subject matter wherein a control for the gear transmission* regulates starting of the engine*.
- 20 Condition responsive engine control:**
This subclass is indented under subclass 15. Subject matter wherein the operation of the engine* is regulated in response to a variable parameter of the gear transmission* or load*.
- 21 Brake engaged when engine energy deactivated, brake disengaged when engine energy activated:**
This subclass is indented under subclass 7. Subject matter wherein regulating means for the engine* is interrelated with regulatory means for a brake* such that (a) when the brake* is in a force applying position to prevent movement, the provision of driving energy to the engine* is discontinued and (b) when the brake* is removed from a force applying position, driving energy to the engine* is provided.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
10, and 11, for limit stops including clutch control.

- 22 Cam actuated brake:**
This subclass is indented under subclass 21. Subject matter wherein the regulating means for the brake* comprises structure which converts rotational motion into translational motion by sliding engagement with an eccentric member.
- 23 Electrically actuated brake:**
This subclass is indented under subclass 21. Subject matter wherein the regulating means for the brake* is operated by electric current.
- 24 Brake actuation opens switch to engine:**
This subclass is indented under subclass 7. Subject matter wherein regulating means is provided to govern operation of a brake*, and wherein movement of the brake regulating means to a force applying position interrupts flow of electricity to the engine.*
- 25 Electrically actuated brake:**
This subclass is indented under subclass 24. Subject matter wherein the regulating means uses electric current to move the brake* to a force applying position.
- 26 Fluid actuated brake:**
This subclass is indented under subclass 24. Subject matter wherein the regulating means uses the force of positively or negatively pressurized liquid or gas to move the brake* to a force applying position.
- 27 Control means selectively operates engine energy input and brake:**
This subclass is indented under subclass 7. Subject matter wherein a regulating means for interrelated engine* and brake* control is operable to alternatively (a) vary an amount of driving energy provided to the engine* or (b) move the brake* to a force applying or release position.
- SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 469+ for lever and linking systems to control a device or devices.
- 28 Fluid actuated brake:**
This subclass is indented under subclass 27. Subject matter wherein the regulating means for the brake* uses the force of positively or
- negatively pressurized liquid or gas to move the brake* to a force applying position.
- 29 Electrically actuated brake:**
This subclass is indented under subclass 27. Subject matter wherein the regulating means for the brake* uses electric current to move the brake* to a force applying position.
- 30 GAS TURBINE ENGINE:**
This subclass is indented under the class definition. Subject matter wherein the engine* is of the type comprising a rotatable shaft carrying blades, which shaft is caused to rotate by the reaction on its blades of a moving gas generated by the burning of fuel.
- SEE OR SEARCH CLASS:
60, Power Plants, subclasses 39.01+ for gas turbine engines, per se.
- 31 Continuously variable transmission:**
This subclass is indented under subclass 30. Subject matter wherein the gear transmission* is of a type having a steplessly changeable speed ratio*.
- 32 WITH SUPERCHARGER:**
This subclass is indented under the class definition. Subject matter wherein the engine* is an internal combustion engine and includes means to increase the pressure of the air supply thereto.
- 33 Manifold pressure control:**
This subclass is indented under subclass 32. Subject matter wherein the intake pressure of the engine* is regulated or used as a regulating signal.
- 34 TRANSMISSION CONTROL:**
This subclass is indented under the class definition. Subject matter wherein the operation of the engine* regulates or is regulated by the operation of a gear transmission*.
- 35 Differential transmission:**
This subclass is indented under subclass 34. Subject matter wherein the gear transmission* is of the planetary-type having at least three relatively rotatable elements, one element constituting an input and the other two outputs, such that a change in speed in one of the out-

- puts has a direct effect on the speed of the other output.
- SEE OR SEARCH CLASS:
180, Motor Vehicles, subclass 197 for wheel slip control during vehicle acceleration by reducing power to wheel; and subclasses 248+ for four-wheel drive with differential, where there is significant vehicle structure.
475, Planetary Gear Transmission Systems or Components, for planetary gear transmission, per se, and particularly subclasses 220+ for differential transmissions.
- 36 Plural outputs:**
This subclass is indented under subclass 34. Subject matter wherein the gear transmission* is effective to drive two load* devices.
- (1) Note. Included herein as separate loads are the front and rear axle of a vehicle, as in a four wheel drive.
- SEE OR SEARCH CLASS:
180, Motor Vehicles, subclasses 234+ for four-wheel drive with significant vehicle structure.
- 37 Continuously variable friction transmission:**
This subclass is indented under subclass 34. Subject matter wherein the gear transmission* is of a type having a steplessly changeable speed ratio* and includes toothless gearing that transmits force by frictional contact.
- 38 With fluid drive:**
This subclass is indented under subclass 37. Subject matter wherein the continuously variable friction transmission is combined with a hydraulic or pneumatic torque transmitting means.
- 39 With clutch control:**
This subclass is indented under subclass 37. Subject matter wherein the continuously variable friction transmission is combined with a means to regulate a clutch*.
- 40 With brake control:**
This subclass is indented under subclass 37. Subject matter wherein the continuously variable friction transmission is combined with a means to regulate a brake*.
- 41 Interrelated control of diverse transmissions:**
This subclass is indented under subclass 37. Subject matter wherein the continuously variable friction transmission is combined with a gear transmission* of a different type and the control of one gear transmission* affects the control of the other gear transmission*.
- 42 Constant speed output:**
This subclass is indented under subclass 37. Subject matter wherein the regulation of the engine* and gear transmission* result in a constant velocity of the transmission output shaft*.
- SEE OR SEARCH CLASS:
180, Motor Vehicles, subclasses 170+ for cruise control in a vehicle with significant vehicle structure.
- 43 Controlled by engine map:**
This subclass is indented under subclass 37. Subject matter wherein the gear transmission* is regulated, at least in part, by a device providing a memory of desirable engine* performance.
- 44 Belt-type:**
This subclass is indented under subclass 37. Subject matter wherein the continuously variable friction transmission comprises an endless flexible band entrained about parallel pulleys.
- 45 Fluid pressure control:**
This subclass is indented under subclass 44. Subject matter wherein the belt drive is regulated by a device operated by pressure of a liquid or gas, and the regulation affects or is affected by the operation of an engine*.
- 46 Ratio change controlled:**
This subclass is indented under subclass 45. Subject matter wherein the regulation of the fluid pressure is effective to change the transmission speed ratio*.

47 Engine coast braking:

This subclass is indented under subclass 46. Subject matter wherein the speed ratio* change is in response to sensing that the load* is attempting to drive the engine*.

48 With electric valve control:

This subclass is indented under subclass 46. Subject matter wherein regulation of the fluid pressure is affected by an electrically actuated valve.

49 Duty ratio control:

This subclass is indented under subclass 48. Subject matter wherein the electrical regulation is by pulse width modulation of on-off signals to the valve.

50 Fluid pressure control:

This subclass is indented under subclass 37. Subject matter wherein the steplessly variable friction transmission is regulated by a device operated by pressure of a liquid or gas.

51 Fluid resistance inhibits rotation of planetary transmission element:

This subclass is indented under subclass 34. Subject matter wherein either the weight or momentum of a fluid mass or a fluids' resistance to flow is effective to retard the rotation of an element of a planetary transmission.

(1) Note. See the definition of Class 475 for definition of a planetary gear set.

SEE OR SEARCH CLASS:

192, Clutches and Power-Stop Control, subclass 61 for clutches of the gear pump-type.
475, Planetary Gear Transmission Systems or Components, subclasses 91+ for internal resistance-type clutches and brakes combined with planetary gearing.

52 Including fluid drive:

This subclass is indented under subclass 34. Subject matter wherein the combination of a hydraulic or pneumatic torque transmitting means and a gear transmission* is interrelated with control of the engine*.

53 Impeller-turbine-type:

This subclass is indented under subclass 52. Subject matter wherein the fluid torque transmitting means is made up of at least two rotary coaxial vaned elements forming a fluid filled torus, one of the elements being an input element and the other an output element.

54 Engine controlled:

This subclass is indented under subclass 53. Subject matter wherein the engine* is regulated by a control signal from the fluid torque transmitting means or the gear transmission*.

55 With countershaft gearing:

This subclass is indented under subclass 53. Subject matter wherein the gear transmission* comprises intermeshing gears on parallel shafts and wherein the axes of the shafts are fixed.

(1) Note. This is to be distinguished from planetary gearing wherein an axis of a planetary gear is not fixed; but, instead, it rotates about another axis.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 718, 720, and 730.1+ for this type of transmission with a fluid drive but without an engine control.

56 And turbine shaft brake:

This subclass is indented under subclass 55. Subject matter wherein there is provided means to stop the output element of the fluid torque transmitting means.

57 And clutch control:

This subclass is indented under subclass 55. Subject matter wherein a clutch* is provided to connect the input and output elements of the fluid torque transmitting means or connect the input element to the gear transmission*, bypassing the fluid torque transmitting means.

58 Control of or by fluid drive:

This subclass is indented under subclass 55. Subject matter wherein the operation of the fluid torque transmitting means is regulated or a condition thereof is effective to regulate the gear transmission*.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
57, for control of the fluid drive by the regulation of a lockup or bypass clutch.
- 59 With hydrodynamic braking:**
This subclass is indented under subclass 53. Subject matter wherein an impeller-turbine unit is utilized to retard rotation of a load*.
- SEE OR SEARCH CLASS:
475, Planetary Gear Transmission Systems or Components, subclass 113 for impeller-turbine units used as brakes for elements of planetary gear sets.
- 60 With nonratio brake:**
This subclass is indented under subclass 53. Subject matter wherein means is provided to stop a part of the gear transmission* or load from rotation and such stoppage does not directly change a gear speed ratio*.
- (1) Note. A nonratio brake is one that does not directly effect a ratio change; e.g, anticreep, parking brake, synchronization brake, etc.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
59, for hydraulic brakes.
- 61 Control responsive to fluid drive:**
This subclass is indented under subclass 53. Subject matter wherein the gear transmission* is controlled by a condition of the fluid torque transmitting means.
- (1) Note. The gear transmission may be controlled, for example, by regulating a clutch* associated with the fluid drive, a ratio changing clutch* or brake*, or the system pressure of the gear transmission* control system.
- SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclass 731.1 for the combination of a fluid drive and nonplanetary gearing with a condition responsive control but no engine control.
- 475, Planetary Gear Transmission Systems or Components, subclass 42, 49, and 61+ for the combination of planetary gearing and fluid drive where a gear transmission is controlled by a condition of the fluid drive, but without an engine control.
- 62 With clutch control:**
This subclass is indented under subclass 53. Subject matter wherein a clutch* is operable to connect the input and output elements of the fluid torque transmitting means or to connect the input element thereof to the gear transmission*, bypassing the said fluid means.
- (1) Note. Where the clutch* control is responsive to a condition of the fluid drive see subclass 61.
- 63 Disengaged during shift:**
This subclass is indented under subclass 62. Subject matter wherein the clutch* is regulated during a change in speed ratio* of the gear transmission*.
- 64 Speed responsive:**
This subclass is indented under subclass 62. Subject matter wherein operation of the clutch* is controlled in response to means detecting velocity or change in velocity of a part associated therewith.
- 65 Electrical:**
This subclass is indented under subclass 64. Subject matter wherein the detecting means or control signal is operated by electrical current.
- 66 With fluid unit vane control:**
This subclass is indented under subclass 53. Subject matter wherein means is provided to regulate the angle or position of the vane(s) within the torus to change the speed and direction of the fluid therein.
- 67 Fill and empty-type fluid units:**
This subclass is indented under subclass 53. Subject matter wherein the fluid torque transmitting means may be emptied or filled for the purpose of changing the amount of slippage between the elements.

- (1) Note. These devices are often used in place of a friction clutch*, for speed ratio* control.
- SEE OR SEARCH CLASS:
475, Planetary Gear Transmission Systems or Components, subclass 34, 42, 50, 64, and 69 for planetary gearing and fill and empty-type fluid units in the absence of an engine control.
- 68 Ratio control:**
This subclass is indented under subclass 52. Subject matter wherein the speed ratio of the fluid torque transmitting means is regulated by the engine*.
- SEE OR SEARCH CLASS:
60, Power Plants, subclasses 445+ for condition responsive control of hydrostatic pump and motor units.
- 69 With planetary transmission control:**
This subclass is indented under subclass 68. Subject matter wherein there is included a gear transmission* of the planetary type which is also regulated by the engine*.
- (1) Note. See Class 475 for the definition of, and structure involving planetary transmission, per se.
- 70 With clutch control:**
This subclass is indented under subclass 34. Subject matter wherein a means is provided to regulate a clutch* and said regulation is interrelated with that of the engine* or gear transmission*.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
7+, for this combination with an electric motor.
39+, for this combination with a continuously variable friction transmission.
57, where the gearing is of the counter shaft-type and the clutch is associated with an impeller-turbine-type fluid drive.
62, where the gearing is of the planetary-type and the clutch is associated with an impeller-turbine-type fluid drive
- 166+, for interrelated engine and clutch control in the absence of a gear transmission control.
- 71 And brake control:**
This subclass is indented under subclass 70. Subject matter wherein in addition to the interrelated engine*, gear transmission* and clutch* controls, means is provided to regulate a brake*, and such brake regulating means affects or is affected by at least one of the other controls.
- 72 Temperature responsive control:**
This subclass is indented under subclass 71. Subject matter wherein the heat level of or surrounding the engine*, gear transmission*, clutch*, or brake* is effective as a control signal.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
76, for temperature responsive control involving only engine, clutch, and gear transmission control.
98, for temperature control involving only engine and gear transmission control.
- SEE OR SEARCH CLASS:
475, Planetary Gear Transmission Systems or Components, subclass 117 for temperature responsive control of a planetary transmission.
- 73 Engine controlled:**
This subclass is indented under subclass 71. Subject matter wherein the clutch*, brake*, or gear transmission* regulate operation of the engine*.
- 74 Clutch controlled:**
This subclass is indented under subclass 71. Subject matter wherein the engine*, gear transmission*, or brake* regulate the operation of the clutch*.
- 75 Gearing controlled:**
This subclass is indented under subclass 71. Subject matter wherein the engine*, clutch*, or brake* regulates the operation of the gear transmission*.

- 76 Temperature responsive control:**
This subclass is indented under subclass 70. Subject matter wherein means are provided to sense a heat level and means responsive to such sensing are provided to regulate the operation of the engine*, gear transmission*, or clutch*.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
72, for temperature responsive control involving an engine, gear transmission, clutch, and brake.
98, for temperature responsive control involving only an engine and gear transmission.
- SEE OR SEARCH CLASS:
475, Planetary Gear Transmission System or Components, subclass 117 for temperature responsive control of a planetary gear transmission.
- 77 Clutch, engine, and transmission controlled:**
This subclass is indented under subclass 70. Subject matter wherein means are provided to regulate the operation of a clutch*, an engine*, and a gear transmission*.
- 78 Electronic digital control:**
This subclass is indented under subclass 77. Subject matter wherein the operation is regulated with the use of a digital computer.
- SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structure.
- 79 Clutch and transmission controlled:**
This subclass is indented under subclass 70. Subject matter wherein the engine* control regulates the operation of a clutch* and a gear transmission*.
- 80 Speed responsive control:**
This subclass is indented under subclass 79. Subject matter wherein the regulation is affected by the velocity of a rotary part.
- 81 With manual override:**
This subclass is indented under subclass 80. Subject matter wherein the speed responsive control may be negated by manual means.
- 82 Vacuum actuated clutch:**
This subclass is indented under subclass 80. Subject matter wherein the clutch* is operated by a source of negative pressure.
- 83 Clutch and engine controlled:**
This subclass is indented under subclass 70. Subject matter wherein the gear transmission* control regulates the operation of a clutch* and an engine*.
- 84 Speed responsive control:**
This subclass is indented under subclass 83. Subject matter wherein the regulation is affected by the velocity of a rotary part.
- 85 Plural speed signals:**
This subclass is indented under subclass 84. Subject matter wherein the regulation is affected by the velocities of more than one rotary part.
- 86 Clutch controlled:**
This subclass is indented under subclass 70. Subject matter wherein operation of the engine* or gear transmission* regulates the operation of a clutch*.
- 87 Electric clutch:**
This subclass is indented under subclass 86. Subject matter wherein the clutch* is actuated by electrical means.
- 88 Vacuum actuated clutch:**
This subclass is indented under subclass 86. Subject matter wherein the clutch* is actuated by a source of negative pressure.
- 89 Electric control:**
This subclass is indented under subclass 88. Subject matter wherein the negative pressure is controlled by electrical means.
- 90 Engine controlled:**
This subclass is indented under subclass 70. Subject matter wherein operation of the clutch* or gear transmission* regulates the operation of an engine*.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 54, for a gear transmission and impeller-turbine-type fluid unit controlling an engine.
- 73, for the combination of a gear transmission, clutch, and brake controlling an engine.
- 101, for engine ignition control.
- 107, for engine control by a transmission, absent a clutch or brake.
- 91 Speed responsive:**
This subclass is indented under subclass 90. Subject matter wherein the operation of the engine* is regulated by the velocity of a rotary part.
- 92 With brake control:**
This subclass is indented under subclass 34. Subject matter wherein means are provided to regulate a brake* and operation of said brake regulating mean is interrelated with the operation of the engine* or gear transmission*.
- 93 Anticreep:**
This subclass is indented under subclass 92. Subject matter wherein, in a vehicle drive, means are provided to prevent the vehicle from moving forward when the engine* is at idle and the vehicle is stopped.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 114, for anticreep devices including only engine and transmission control.
- 94 Brake controls transmission:**
This subclass is indented under subclass 92. Subject matter wherein the means to regulate the brake* affect the operation of the gear transmission*.
- 95 Pressure controlled:**
This subclass is indented under subclass 94. Subject matter wherein the gear transmission* is controlled by fluid and the means to or regulate the brake* affects the force exerted by the fluid.
- 96 One control blocks another:**
This subclass is indented under subclass 92. Subject matter wherein the operation of either the engine*, gear transmission*, or brake* is prevented by the operation of one of the others.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 125, where only engine and transmission controls are involved.
- 97 Control by sensed ambient condition, pattern indicia, or external signal:**
This subclass is indented under subclass 34. Subject matter wherein means are provided to sense (1) a condition or change in condition of the atmosphere surrounding the engine or gear transmission* or (2) the presence or absence of indicative means on a prescribed record or (3) a signal from a source not physically connected to the engine*, gear transmission* or load* or (4) the heat level of a part of the engine or gear transmission*; and, in response to the sensing, regulate the operation of the engine* or gear transmission*.
- 98 Temperature control:**
This subclass is indented under subclass 97. Subject matter wherein means are provided to sense a heat level, and means responsive to such sensing regulates the operation of the engine* or gear transmission*.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 72, for other temperature responsive controls and see the search notes thereunder.
- 99 Engine starting interlock:**
This subclass is indented under subclass 34. Subject matter wherein the gear transmission* control regulates starting of the engine*.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 19, for starting interlocks with electric motors.

- SEE OR SEARCH CLASS:
180, Motor Vehicles, subclasses 271+ for interlocks with significant vehicle structure.
- 100 Exhaust emission control:**
This subclass is indented under subclass 34. Subject matter wherein the engine* is an internal combustion engine and regulation of the engine* includes means to regulate the discharge of undesirable engine waste gas constituents.
- SEE OR SEARCH CLASS:
60, Power Plants, subclasses 272+ for an internal combustion engine with treatment or handling of exhaust gas.
123, Internal-Combustion Engines, appropriate subclasses for engine emission control in the absence of a gear transmission.
- 101 Engine ignition control for transmission change:**
This subclass is indented under subclass 34. Subject matter wherein the engine* is of a type requiring periodic ignition for continued operation and the means to regulate the operation of the engine includes means to regulate or interrupt the periodic ignition to enable a gear transmission* speed ratio* change.
- 102 Ignition advanced or retarded:**
This subclass is indented under subclass 101. Subject matter wherein the ignition takes place at a particular time with respect to the operation of the engine* parts and the regulation of the engine* includes regulation of the ignition timing.
- 103 Ignition intermitting and safety means limiting duration of intermission:**
This subclass is indented under subclass 101. Subject matter wherein the ignition is interrupted for a predetermined time regardless of whether the speed ratio* change is completed or not.
- 104 Ignition intermitting controlled by manifold pressure:**
This subclass is indented under subclass 101. Subject matter wherein the engine* is an air breathing engine* and means are provided to sense the pressure at the intake of the engine and in response thereto regulate the interruption of the periodic ignition.
- 105 Ignition intermitting initiated by positioning accelerator:**
This subclass is indented under subclass 101. Subject matter wherein the interruption of the ignition is initiated by placing a manual control for energy input to the engine* in a predetermined position.
- 106 Initiation inhibited by sensed condition:**
This subclass is indented under subclass 105. Subject matter wherein means is provided to sense a condition or change in condition and in response thereto prevent the manual control from initiating the interruption of the ignition.
- 107 Engine controlled by transmission:**
This subclass is indented under subclass 34. Subject matter wherein means is provided to regulate a supply of energy to the engine* and such regulation is affected by the operation of the gear transmission*.
- 108 Constant output shaft speed:**
This subclass is indented under subclass 107. Subject matter wherein the engine* is regulated such that a load* shaft of the gear transmission* remains at an unchanging velocity.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
123, Internal Combustion Engines, subclasses 319+ for engine speed regulation without transmission control.
180, Motor Vehicles, subclasses 170+ for cruise control involving significant vehicle structure or lacking transmission control.
- 109 Diminution during transmission change:**
This subclass is indented under subclass 107. Subject matter wherein energy input supplied to the engine* is modified by decreasing the supply while the gear transmission* speed ratio* is being changed.
- 110 Responsive to transmission output condition:**
This subclass is indented under subclass 107. Subject matter wherein energy input supplied to the engine is regulated by a condition or

- change of condition of an output shaft* of the gear transmission*.
- 111 Transmission setting contingent:**
This subclass is indented under subclass 107. Subject matter wherein means are provided to sense the selection of a particular gear transmission* speed ratio*, and, in response to such sensing, means are provided to affect the energy input supplied to the engine*.
- 112 Change to neutral idles engine:**
This subclass is indented under subclass 111. Subject matter wherein the means to sense the selection is capable of disengaging all speed ratios*, and, in response thereto, is effective to decrease energy input to the engine* to a minimum while allowing the engine* to continue operating.
- 113 Engine input variable in neutral:**
This subclass is indented under subclass 112. Subject matter wherein energy supply to the engine* is changeable while all gear speed ratios* are disengaged.
- 114 Anticreep:**
This subclass is indented under subclass 34. Subject matter wherein in a vehicle drive, means are provided to prevent the vehicle from moving forward when the engine is at idle and the vehicle is stopped.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
93, wherein in addition to an engine and gear transmission, a brake is involved.
- 115 Transmission controlled by engine:**
This subclass is indented under subclass 34. Subject matter wherein the operation of the gear transmission* is regulated by the operation of the engine*.
- 116 Shift from neutral shock control:**
This subclass is indented under subclass 115. Subject matter wherein a manual means is movable to a first position to effect engagement of a speed ratio* of the gear transmission* or to a second position to effect disengagement of all ratios and wherein means is provided to limit impulsive forces within the gear transmission* when the gear transmission* is shifted between first and second positions.
- 117 Pressure controlled:**
This subclass is indented under subclass 116. Subject matter wherein the gear transmission* is regulated by pumped fluid and the said shift affects the force exerted by the fluid.
- 118 Engine (coast) braking:**
This subclass is indented under subclass 115. Subject matter wherein a speed ratio* change is controlled in response to sensing that the load* is attempting to drive the engine.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
47, for engine braking with a belt transmission.
- 119 Electric valve control:**
This subclass is indented under subclass 118. Subject matter wherein the speed ratio* change is controlled by an electrically operated valve.
- 120 By acceleration:**
This subclass is indented under subclass 115. Subject matter wherein means for the regulation of the gear transmission* includes a signal responsive to the rate of change of velocity with respect to time of a gear transmission* part or a load* driven thereby.
- 121 By input manifold pressure or engine fuel control:**
This subclass is indented under subclass 115. Subject matter wherein the engine* is an air breathing, fuel burning type and the gear transmission* is regulated by air pressure at the intake of the engine or by a means to feed the fuel.
- 122 Selector-type:**
This subclass is indented under subclass 121. Subject matter wherein a manual means is provided to choose a gear speed ratio* of the gear transmission* but the change to said ratio is not effected until a manual control for fuel to the engine* is placed in a particular position.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
133, 136 and 141, for forced downshifts by placing the fuel control in a particular

position and not preceded by a preselection of gear ratio.

123 With positive shift means:

This subclass is indented under subclass 121. Subject matter wherein the gear transmission* uses toothed positively engaging elements to change from one speed ratio* to another, and including the sliding of a gear on a shaft to effect ratio change.

124 With synchronization:

This subclass is indented under subclass 123. Subject matter wherein means are provided to equalize the speed of the parts of the engaging elements before they are engaged.

125 Prevents unsafe or unintentional shift:

This subclass is indented under subclass 121. Subject matter wherein means are provided to prohibit the changing of the speed ratio* of the gear transmission* when such change may harm the engine* or gear transmission.

126 Reverse inhibitor:

This subclass is indented under subclass 125. Subject matter wherein the speed ratio* change that is prohibited is that which would change the direction of rotation of a gear transmission* load* shaft.

127 Shift valve control:

This subclass is indented under subclass 121. Subject matter wherein a reciprocating valve is effective to trigger the actuation of a speed ratio* change in the gear transmission* said valve being regulated by a signal responsive to the input manifold pressure or engine fuel control.

(1) Note. Usually the valve is controlled by both an engine signal and vehicle speed responsive signal.

128 Hysteresis:

This subclass is indented under subclass 127. Subject matter wherein the regulation of the valve is such that should a given signal level be necessary to move the valve in one direction, movement in a second direction must overcome a greater signal level.

(1) Note. This prevents "hunting" by the valve.

129 Electric control:

This subclass is indented under subclass 128. Subject matter wherein a signal used to regulate the valve is electric.

130 Plural shift valves:

This subclass is indented under subclass 127. Subject matter wherein two valves are regulated by signals responsive to input manifold pressure or engine* fuel control to trigger actuation of two speed ratio* changes.

131 Electric control:

This subclass is indented under subclass 130. Subject matter wherein the signal is electric.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structures.

132 Downshift control:

This subclass is indented under subclass 131. Subject matter wherein significance is attributed to means for changing from a high speed ratio* to a lower speed ratio*.

133 Kickdown:

This subclass is indented under subclass 132. Subject matter wherein a forced downshift is effected by moving a manual engine* fuel control to a predetermined position.

SEE OR SEARCH THIS CLASS, SUBCLASS:

101+, wherein addition to the downshift the periodic ignition is interrupted.

122, for the manual selection of gear ratio followed by actuation thereof by placement of a fuel control.

136, and 141, for other kickdown combinations.

134 Selector valve overrule:

This subclass is indented under subclass 131. Subject matter wherein significance is attributed to a manual valve movable to choose various gear speed ratios* of the gear transmission* and movable to a predetermined

- position to prevent normal operation of a shift valve.
- 135 Downshift control:**
This subclass is indented under subclass 130. Subject matter wherein significance is attributed to means for changing from a high speed ratio* to a lower speed ratio*.
- 136 Kickdown:**
This subclass is indented under subclass 135. Subject matter wherein a forced downshift is effected by moving a manual engine* fuel control to a predetermined position.
- (1) Note. See subclass 133 and the notes thereunder for other accelerator triggered controls.
- 137 Selector valve overrule:**
This subclass is indented under subclass 130. Subject matter wherein significance is attributed to a manual valve movable to choose various gear speed ratios* of the gear transmission* and movable to a predetermined position to prevent normal operation of a shift valve.
- 138 Electric control:**
This subclass is indented under subclass 127. Subject matter wherein the signal is electric.
- SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structure.
- 139 Downshift control:**
This subclass is indented under subclass 138. Subject matter wherein significance is attributed to means for changing from a high speed ratio* to a lower speed ratio*.
- 140 Downshift control:**
This subclass is indented under subclass 127. Subject matter wherein significance is attributed to means for changing from a high speed ratio* to a lower speed ratio*.
- 141 Kickdown:**
This subclass is indented under subclass 140. Subject matter wherein a forced downshift is effected by moving a manual engine* fuel control to a predetermined position.
- (1) Note. See subclass 133 and the notes thereunder for other accelerator triggered controls.
- 142 Selector valve overrule:**
This subclass is indented under subclass 127. Subject matter wherein significance is attributed to a manual valve movable to choose various gear speed ratios* of the gear transmission* and movable to a predetermined position to prevent normal operation of a shift valve.
- 143 Servomotor timing:**
This subclass is indented under subclass 121. Subject matter wherein a speed ratio* of the gear transmission* is engaged by a fluid actuated piston forming a movable wall of a chamber and means is provided to regulate the buildup or release of fluid pressure in one or more of such chambers.
- 144 Downshift:**
This subclass is indented under subclass 143. Subject matter wherein significance is attributed to regulating pressure in the chamber on a shift from a high speed ratio* to a lower speed ratio*.
- 145 With fluid accumulator:**
This subclass is indented under subclass 144. Subject matter wherein a variable enclosed space is placed in communication with the chamber to control the buildup or release of fluid in such chamber.
- (1) Note. Included under this definition are “trimmer” valves which exhaust pressure in a fluid line until pressure builds up in an adjoining chamber and shuts off the exhaust.
- SEE OR SEARCH CLASS:
138, Pipes And Tubular Conduits, subclasses 30+ for accumulators, per se.

- 475, Planetary Gear Transmission Systems or Components, subclass 129 for accumulator control of planetary gearing without an engine control.
- 146 Electric valve control:**
This subclass is indented under subclass 145. Subject matter wherein control of fluid to or from said chamber is by means of an electrically operated valve.
- SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structure.
- 147 Double acting servo:**
This subclass is indented under subclass 144. Subject matter wherein the piston is actuated by fluid pressure to engage a gear speed ratio* and is also actuated by fluid pressure to disengage the said ratio.
- 148 Speed responsive control:**
This subclass is indented under subclass 144. Subject matter wherein the regulation of buildup or release of fluid pressure is controlled by the velocity of a gear transmission* part.
- 149 Electric valve control:**
This subclass is indented under subclass 144. Subject matter wherein control of fluid pressure to or from said chamber is by means of an electrically operated valve.
- SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structure.
- 150 With fluid accumulator:**
This subclass is indented under subclass 143. Subject matter wherein a variable enclosed space is placed in communication with the chamber to control the buildup or release of fluid in such chamber.
- (1) Note. Included under this definition are “trimmer” valves which exhaust pressure in a fluid line until pressure builds up in an adjoining chamber and shuts off the exhaust.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
145, for fluid accumulators associated with a downshift control.
- SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 30+ for accumulators, per se.
475, Planetary Gear Transmission Systems or Components, subclass 129 for accumulator control of planetary gearing without an engine control.
- 151 Engine parameter controls back pressure:**
This subclass is indented under subclass 150. Subject matter wherein a movable piston functions to vary the capacity of the accumulator space, and a signal representing input manifold pressure or engine* fuel control biases the piston to change the resistance to movement of the piston.
- 152 Electric valve control:**
This subclass is indented under subclass 150. Subject matter wherein control of fluid to or from said chamber is by means of an electrically operated valve.
- SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structure.
- 153 Double acting servo:**
This subclass is indented under subclass 143. Subject matter wherein the piston is actuated by fluid pressure to engage a gear speed ratio* and is also actuated by fluid pressure to disengage the said ratio.
- 154 Speed responsive control:**
This subclass is indented under subclass 143. Subject matter wherein the regulation of buildup or release of fluid pressure is con-

- trolled by the velocity of a gear transmission* part.
- 155 Electric valve control:**
This subclass is indented under subclass 143. Subject matter wherein control of fluid pressure to or from the chamber is by means of an electrically operated valve.
- SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 51+ for vehicle transmission control including significant calculations but absent specific transmission structure.
- 156 Transmission pressure controlled:**
This subclass is indented under subclass 121. Subject matter wherein the gear transmission* is controlled by fluid pressure which is regulated by engine* intake pressure or means to feed the fuel.
- 157 Variable capacity pump:**
This subclass is indented under subclass 156. Subject matter wherein a pump is the source of fluid pressure and the engine* intake pressure or fuel feed is effective to control the volumetric capacity of said pump.
- 158 Line pressure controlled:**
This subclass is indented under subclass 156. Subject matter wherein a pump is the source of fluid pressure and feeds fluid to a valve effective to regulate said pressure in response to engine* intake pressure or fuel feed.
- 159 Responsive to speed:**
This subclass is indented under subclass 158. Subject matter wherein the valve is also influenced by the velocity of a gear transmission* part.
- 160 Electric valve control:**
This subclass is indented under subclass 159. Subject matter wherein the engine* intake pressure, fuel feed or velocity signal is an electric signal.
- 161 Duty ratio control:**
This subclass is indented under subclass 160. Subject matter wherein the electric signal is variable and effective to variably regulate a
- fluid pressure by pulse width modulation of on-off signals to the valve.
- 162 Transmission setting contingent:**
This subclass is indented under subclass 158. Subject matter wherein the valve is also influenced by means sensing the particular gear speed ratio* engaged at that time.
- 163 Electric valve control:**
This subclass is indented under subclass 158. Subject matter wherein the engine* intake pressure or fuel feed signal is an electric signal.
- 164 Electric valve control:**
This subclass is indented under subclass 156. Subject matter wherein the engine intake pressure or fuel feed signal is an electric signal.
- 165 Engine control linkage mounted on manual gearshift lever:**
This subclass is indented under subclass 34. Subject matter wherein a manual lever is utilized to regulate operation of a gear transmission* and the lever supports means movable relative thereto which means is operative to regulate an engine*.
- 166 CLUTCH CONTROL:**
This subclass is indented under the class definition. Subject matter wherein the operation of the engine* regulates or is regulated by the operation of a clutch*.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
5, and 6, for a clutch control in combination with plural engines.
8+, for clutch control in combination with an electric engine.
39, for clutch control in combination with a continuously variable friction transmission.
57, and 62+, for clutch control in combination with a fluid drive and transmission.
70+, for clutch control in combination with transmission control.
- 167 With starter:**
This subclass is indented under subclass 166. Subject matter wherein an engine* starting device is interrelated with the clutch* operation.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
99, for engine starting interlocked with transmission control.
- 168 With fluid drive:**
This subclass is indented under subclass 166. Subject matter wherein a hydraulic or pneumatic torque transmitting means is interrelated with clutch* control.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
57, for clutch control interrelated with impeller-turbine fluid drive and countershaft gearing.
62, for clutch control interrelated with impeller-turbine fluid drive and transmission.
- 169 Speed responsive control:**
This subclass is indented under subclass 168. Subject matter wherein the clutch control is responsive to a signal derived from the velocity of a moving part.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
64+, for speed responsive clutch control in an impeller-turbine fluid drive in combination with a transmission.
- 170 With brake control:**
This subclass is indented under subclass 166. Subject matter wherein a brake* control is interrelated with clutch* and engine* control.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
71, for brake control is combination with transmission and clutch control.
- 171 Clutch controlled:**
This subclass is indented under subclass 170. Subject matter wherein means to control the clutch* is interrelated with the brake* control.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
74, for brake control in combination with clutch and transmission control wherein the clutch is the controlled element.
- 172 And brake controlled:**
This subclass is indented under subclass 171. Subject matter wherein means are provided to control both the clutch* and the brake*.
- 173 Engine controlled:**
This subclass is indented under subclass 170. Subject matter wherein means are provided to control the engine* and such means is interrelated with clutch* and brake* control.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
73, for brake control in combination with a transmission and clutch control wherein the engine is controlled.
- 174 Condition responsive control:**
This subclass is indented under subclass 166. Subject matter wherein the clutch* control is subject to an additional variable parameter.
- 175 Speed responsive:**
This subclass is indented under subclass 174. Subject matter wherein the variable parameter is the velocity of a moving part.
- 176 Slip rate control:**
This subclass is indented under subclass 175. Subject matter wherein a speed differential between parts of a clutch* is regulated.
- 177 Overload release:**
This subclass is indented under subclass 174. Subject matter wherein the additional parameter is torque experienced by the load*, and the clutch is disengaged when the torque exceeds a predetermined value.
- 178 Engine shut off:**
This subclass is indented under subclass 177. Subject matter wherein motive power to the engine* is terminated upon disengagement of the clutch*.
- 179 Electric clutch:**
This subclass is indented under subclass 166. Subject matter wherein the clutch is actuated by electrical current.

- 180 Regulated clutch engagement:**
This subclass is indented under subclass 166. Subject matter wherein significant is attributed to timing of movement of clutch* element during engagement.
- 181 Engine controlled by clutch control:**
This subclass is indented under subclass 166. Subject matter wherein operation of the clutch* regulates operation of the engine*
- 182 BRAKE CONTROL:**
This subclass is indented under the class definition. Subject matter wherein operation of the engine* regulates or is regulated by the operation of a brake*.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 2+, for brake control in combination with plural engines.
 - 7+, for brake control in combination with an electric engine.
 - 40, for brake control in combination with a continuously variable friction transmission.
 - 52+, for brake control in combination with a fluid drive and transmission.
 - 71+, for combined transmission, brake, and clutch control.
 - 92+, for combined transmission and brake control.
 - 170+, for combined clutch and brake control.
- 183 Sensed condition responsive control of engine or brake:**
This subclass is indented under subclass 182. Subject matter including means to detect a parameter or change in a parameter and having means responsive thereto to regulate operation of the engine* or brake*.
- 184 Brake:**
This subclass is indented under subclass 183. Subject matter wherein operation of the brake* is regulated.
- 185 And engine:**
This subclass is indented under subclass 184. Subject matter wherein operation of the engine* is also regulated.
- 186 Speed or acceleration responsive:**
This subclass is indented under subclass 184. Subject matter wherein the parameter is velocity or rate of change of velocity of a moving part.
- SEE OR SEARCH CLASS:
- 188, Brakes, subclasses 180+ for speed responsive brake operators.
 - 303, Fluid-Pressure and Analogous Brake System, subclasses 121+ for brakes regulated by a speed condition.
- 187 Speed or accelerations responsive:**
This subclass is indented under subclass 183. Subject matter wherein the parameter is velocity or rate of change of velocity of a moving part.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 186, for interrelated engine and brake control wherein the brake is controlled in responsive to speed or acceleration, and see the search notes thereunder.
- 188 Plural diverse brake means:**
This subclass is indented under subclass 182. Subject matter including at least two operationally different and distinct brakes*, each having a regulation means, and at least one of the brake regulating means is interrelated with regulating means for the engine*.
- 189 Engine energy control having adjusting and holding device, with means on brake control to override holding device:**
This subclass is indented under subclass 182. Subject matter wherein engine* regulating means is operable to govern the energy input to the engine* and includes mechanism to set and lock the engine regulating means at a desired position; combined with apparatus to disengage the setting and locking mechanism simultaneously with activation of the brake*.
- 190 Holding device engaged by electric means:**
This subclass is indented under subclass 189. Subject matter wherein the setting and locking mechanism is actuated by a structure using electric current.

- 191 Magnetic holding device:**
This subclass is indented under subclass 190. Subject matter wherein a magnetic attracting force is used to prevent movement of the engine* regulating means.
- 192 Mechanical holding device engaged by mechanical means:**
This subclass is indented under subclass 189. Subject matter wherein the setting and locking mechanism includes structure to lock the engine* regulating means against movement and further includes a device to actuate the locking structure; wherein said structure and device is operated by force other than fluid pressure.
- 193 Device or means including a threaded shaft, rack, or ratchet:**
This subclass is indented under subclass 192. Subject matter wherein said structure or device comprises (a) a cylindrical bar with a continuous helical rib projecting from the external surface which is engaged by interfitting projections on a member for transferring force, (b) a bar with notch or teeth projecting transversely from a longitudinal surface which is engaged by interfitting projections on a member for transferring force, or (c) a unidirectionally rotatable force transmitting member.
- 194 Brake control having holding device, with means on engine control to override holding device:**
This subclass is indented under subclass 182. Subject matter wherein regulating means for the brake* includes mechanism to set and lock the brake regulating means at a desired position; combined with apparatus to disengage the setting and locking mechanism simultaneously with regulation of the engine*.
- 195 Holding device responsive to motion, speed, or acceleration:**
This subclass is indented under subclass 194. Subject matter including means to detect movement, velocity or rate of change of velocity, and having an actuator responsive to such detection to effect operation of the locking mechanism.
- 196 Holding device comprising brake valve operated by solenoid:**
This subclass is indented under subclass 195. Subject matter wherein the brake* is regulated by fluid under pressure flowing through a passage, and the locking mechanism comprises a fluid restricting device within the passage movable between open, shut, or partially open positions by structure comprising a ferrous core moved longitudinally inside a cylindrical coil of wire by magnetic force generated by flow of electric current in the wire.
- 197 Holding device engaged by electric means:**
This subclass is indented under subclass 194. Subject matter comprising structure using electric current to actuate the locking mechanism.
- 198 Holding device comprising brake valve operated by solenoid:**
This subclass is indented under subclass 197. Subject matter wherein the brake* is regulated by fluid under pressure flowing through a passage, and the locking mechanism comprises a fluid restricting device within the passage movable between open, shut, or partially open positions by structure comprising a ferrous core moved longitudinally inside a cylindrical coil of wire by magnetic force generated by flow of electric current in the wire.
- 199 Brake engaged when engine energy deactivated, brake disengaged when engine energy activated:**
This subclass is indented under subclass 182. Subject matter wherein regulating means for the engine* is interrelated with regulating means for the brake* such that (a) when the brake* is in a force applying position to prevent movement, the provision of driving energy to the engine* is discontinued and (b) when the brake* is removed from a force applying position, driving energy to the engine* is provided.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
21+, when the engine is an electric motor.
- 200 Internal combustion engine:**
This subclass is indented under subclass 199. Subject matter wherein the driving energy for the engine* is a combustible material which is

- burned to expand within a combustion chamber to drive a piston in the chamber.
- 201 Controls brake valve:**
This subclass is indented under subclass 200. Subject matter wherein the regulating means for the brake* moves the brake* into an operating position by the action of fluid flowing through a passage, and the regulating means of the engine* operates a fluid restricting device in the passage between open, shut, and partially open positions.
- 202 Vacuum actuated brake:**
This subclass is indented under subclass 201. Subject matter wherein the fluid within the passage is at a lower pressure than the environment so that as pressure is selectively removed therefrom environmental pressure moves the brake* into a force applying position.
- 203 Brake condition change modifies engine condition:**
This subclass is indented under subclass 182. Subject matter wherein a variation of a characteristic of the brake* regulates the engine*.
- 204 Brake actuation interrupts ignition circuit of fluid engine:**
This subclass is indented under subclass 203. Subject matter wherein the engine* is of a type requiring periodic ignition of a fluid by flow of electric current, and wherein movement of the brake* to a force applying position produces a discontinuity in the flow of electric current.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
101+, for engine ignition control for transmission charge.
- 205 Brake actuation decreases or eliminates fluid energy input to engine:**
This subclass is indented under subclass 203. Subject matter wherein the engine* is driven by fluid energy, and wherein movement of the brake* into a force applying position causes engine* regulating means to reduce or exclude the quantity of driving fluid supplied to the engine.
- 206 By closing throttle valve:**
This subclass is indented under subclass 205. Subject matter wherein the regulating means of the engine* includes a drive fluid passage having a restrictor operable between open, shut, or partially open positions, and wherein movement of an element of the brake* moves the restrictor from an open to a shut or partially open position.
- 207 By preventing increasing operation of engine energy control:**
This subclass is indented under subclass 205. Subject matter wherein the engine* regulating means increases or decreases the quantity of driving fluid to the engine*, and wherein actuation of the brake* prohibits the engine regulating means from increasing the quantity of driving fluid supplied to the engine.
- 208 Decreasing fluid energy input to engine actuates brake:**
This subclass is indented under subclass 182. Subject matter wherein the engine* is driven by fluid energy and wherein engine regulating means varies the quantity of driving fluid passing to the engine*, and wherein operation of the regulating means to reduce the quantity of driving fluid to the engine also moves the brake* into a force applying position.
- 209 Control means selectively operates engine energy input and brake:**
This subclass is indented under subclass 182. Subject matter wherein interrelated engine* and brake* regulating means alternatively (a) varies an amount of driving energy supplied to the engine and (b) moves the brake* into a force applying or releasing position.
- (1) Note. The interrelated regulating means usually comprises (a) single working element moveable by a human operator for alternative regulation of the engine or the brake; or (b) plural working elements engageable by a human foot wherein the foot is moveable in more than one direction for alternative regulation of the engine or of the brake.

210 Foot operated control means:

This subclass is indented under subclass 209. Subject matter wherein the interrelated engine* and brake* regulating means are caused to function by engagement with the terminal part of a human leg; i.e., foot.

211 Engine and brake control including interconnected elements:

This subclass is indented under subclass 210. Subject matter wherein the interrelated engine* and brake* regulating means comprises working members which are attached to each other and are independently operated by separate engagement with the foot.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 478.5 for two foot operated controllers for separate systems.

212 Pivots and translates:

This subclass is indented under subclass 210. Subject matter wherein the interrelated engine* and brake* regulating means comprises a single member-engaged by the foot, and the member is alternatively or simultaneously (a) turned about a relatively fixed axis and (b) moved linearly; i.e., translated.

213 Pivots about intermediate fulcrum:

This subclass is indented under subclass 212. Subject matter wherein the relatively fixed axis is located between the ends of the member such that either end of the member can be moved about the axis.

214 Pivots about two fulcrums:

This subclass is indented under subclass 210. Subject matter wherein the interrelated engine* and brake* regulating means comprises a single member engaged by the foot, which member is alternatively (a) turned about a first relatively fixed axis and (b) turned about a second relatively fixed axis.

215 Pivots about intermediate fulcrum:

This subclass is indented under subclass 210. Subject matter wherein the interrelated engine* and brake* regulating means comprises a single member engaged by the foot, which member is turned about a relatively fixed axis, and the axis is located between the ends of the

member such that either end of the member can be moved about the axis.

216 Lever reciprocates on moveable supports at both ends:

This subclass is indented under subclass 210. Subject matter wherein the interrelated engine* and brake* regulating means comprises a single member engaged by the foot which member is alternatively moved back and forth on each displaceably held terminus.

217 Pivots for sequential operation:

This subclass is indented under subclass 210. Subject matter wherein the interrelated engine* and brake* regulating means comprise a single member engaged by the foot whereby force is applied at one end only to turn that member about a relatively fixed axis and whereby initial turning movement regulates one of the engine* or brake*, and continued rotation regulates the other of the engine* or brake*.

218 Control means including fluid passage:

This subclass is indented under subclass 209. Subject matter wherein the interrelated engine* and brake* regulating means includes a flow path for liquid or gas.

CROSS-REFERENCE ART COLLECTIONS

900 CONTROL SIGNAL IS VEHICLE WEIGHT:

This subclass is indented under the class definition. A collection of patents wherein the total mass of the vehicle regulates a power delivery control.

SEE OR SEARCH CLASS:

180, Motor Vehicles, subclass 290 for vehicle safety promotion responsive to weight.

901 CONTROL SIGNAL IS SLOPE:

This subclass is indented under the class definition. A collection of patents wherein the angle of inclination of the road surface regulates a power delivery control.

SEE OR SEARCH THIS CLASS, SUBCLASS:

42, and 108, for cruise control responsive to slope.

902 CONTROL SIGNAL IS ENGINE PARAMETER OTHER THAN MANIFOLD PRESSURE OR FUEL CONTROL:

This subclass is indented under the class definition. A collection of patents wherein a condition of the engine other than manifold pressure or fuel control regulates a power delivery control.

903 CONTROL SIGNAL IS STEERING:

This subclass is indented under the class definition. A collection of patents wherein means to change the direction of travel of a vehicle regulates a power delivery control.

SEE OR SEARCH CLASS:

180, Motor Vehicles, subclass 421 for condition modulated steering.

904 CONTROL SIGNAL IS ACCELERATION:

This subclass is indented under the class definition. A collection of patents wherein the time rate of change of the velocity of an element regulates a power delivery control.

905 Acceleration of throttle signal:

This subclass is indented under subclass 904. A collection of patents wherein the element is the throttling element of an internal combustion engine.

906 MEANS DETECTING OR AMELIORATING THE EFFECTS OF MALFUNCTION OR POTENTIAL MALFUNCTION:

This subclass is indented under the class definition. A collection of patents wherein means are provided for sensing an abnormal condition or potentially abnormal condition and neutralizing a consequence of the abnormal condition or potentially abnormal condition.

907 Redundant:

A collection of patents under collection 906 wherein duplicate means are provided to neutralize the effects of an abnormal or potentially abnormal condition.

908 IN SERIES TRANSMISSION:

This subclass is indented under the class definition. A collection of patents wherein two or more transmissions are in series and their power delivery controls are interrelated.

END