

CLASS 192, CLUTCHES AND POWER-STOP CONTROL**SECTION I - CLASS DEFINITION**

This class includes clutches, combinations including vortex flow drive and clutch, vortex flow drive and brake, clutch and brake, and clutch and gear; and also includes mechanism for joint control of transmission and clutch, and transmission and brake.

This class includes the control of those various power-transmission means, motors, and brakes the motions of which occur at the completion of a cycle of operations or which are due to contact with the material handled by the machine or to the defective action of the parts of the machine operated or to such operations as arise from the initiation of measures for the safety of the operator.

This class is also the generic locus for clutches and brakes (see below for subclass references).

SECTION II - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

21.5, 107+, for both clutches and brakes of the subject matter herein classified.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses, especially 640+ for clutches or brakes and clutches used to modify or control a gearing organization, where specific gearing structure is claimed.
- 180, Motor Vehicles, subclasses 6.2+ for various clutch and brake arrangements providing for steering by driving, where some specific steering by driving vehicle structure is claimed.
- 188, Brakes, appropriate subclasses for motor vehicle mounted brakes used in association with clutches, where the clutch is not claimed.
- 234, Selective Cutting (e.g., Punching), appropriate subclasses, for the starting and stopping of a selective cutting machine in response to various predetermined conditions; especially subclass 21 for means to stop after a given number of operations, and subclass 51 for unicyclic or nonrepeat drive means.

- 242, Winding, Tensioning, or Guiding, subclasses 257+ for a clutch in a fishing reel, subclasses 264+ for a releasable coupling in a fishing reel, subclass 356.6 for a one-way clutch in the drive of a winder of an information bearing carrier, subclasses 394+ for a clutch in a reeling device of general use, subclasses 484.6+ for a helical winding machine drive which may include a clutch, and subclasses 545+ for a clutch in the drive on a convolute winding machine in which particular winding or unwinding structure is specified.
- 399, Electrophotography, subclass 210 for damping or braking a slit exposure scanning carriage.
- 418, Rotary Expansible Chamber Devices, subclass 69, for rotary expansible chamber devices combined with a nominally claimed clutch device.
- 475, Planetary Gear Transmission Systems or Components, appropriate subclasses, for clutches or brakes and clutches used to modify or control a planetary gearing organization.
- 477, Interrelated Power Delivery Controls, Including Engine Control, for interrelated control between an engine and a transmission, clutch, or brake.

SUBCLASSES

- 3.21 VORTEX-FLOW DRIVE AND CLUTCH:**
This subclass is indented under the class definition. Apparatus comprising the combination of a clutch under the ... and a device described in (1) Note below as a "Vortex-Flow Drive".
- (1) Note. For the purposes of this subclass (3.21) and subclass 3.34 below, a "Vortex-Flow Drive" is defined as a device for transmitting torque from a first, rotating shaft to a second, coaxial rotatable shaft, to which shafts are secured shroud elements, each of which is generally concave (e.g., hemispherical or hemitoroidal) and provided with generally radial vanes secured within the concavity, the elements being capable of rotation relative to one another, but together forming a spheroidal or toroidal enclosure for a mass of liquid material, in which device rotation of the first shaft (and of the vanes carried thereby) causes particles of the liquid mass to circulate in a small cir-

cle that lies in a plane coincident with (or parallel to) the axis of rotation of the shafts and simultaneously circulate in a larger circle that lies in a plane at right angles to said axis, which circulation of the mass causes rotation of the second shaft as the vanes carried thereby are moved by the fluid.

- (2) Note. The device termed herein "Vortex-Flow Drive", is known in the art by such names as "fluid drive", "fluid coupling", "fluid flywheel", "torque converter", and "hydrokinetic torque transformer", among others. Such devices generally fall into one of two categories. In one of these (e.g., "fluid coupling") the angular velocity of the driven shroud element referred to in (1) Note cannot be greater than that of the driving element (and is usually less due to slippage); thus the torque is not increased. In the other category (e.g., "torque converter") an additional, radially-vaned element is interposed in the flow of fluid to modify direction of movement and velocity in the fluid and thereby change the torque transmitted from the first shaft to the second shaft.
- (3) Note. A combination of vortex-flow drive and clutch which, per se, is classified in this subclasses (3.21+) is properly classified in Class 74 or Class 475 if gearing is also recited in the claims.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 57, for an assemblage of mechanical and fluent material clutches.

SEE OR SEARCH CLASS:

- 60, Power Plants, subclasses 330+ for a "vortex-flow drive" device, per se.
- 74, Machine Element or Mechanism, subclass 730 for the combination of vortex-flow drive and gearing; and see (3) Note above.
- 475, Planetary Gear Transmission Systems or Components, subclasses 31+, for fluid drive and control in planetary gear transmission; and see (3) Note above.

3.22 With means to effect torque reversal:

This subclass is indented under subclass 3.21. Device including a rotated input shaft that drives the combination (i.e., the vortex-flow drive plus the clutch), and a rotatable output shaft which may be driven by said combination in a first direction of rotation, and provided with means to change the direction of rotation of said output shaft while the input shaft continues to rotate in its original direction.

- (1) Note. The shafts referred to in the definition above are not necessarily those referred to in the definition of "Vortex-Flow Drive", as found in (1) Note to the definition of subclass 3.21. If, in a particular disclosure, a shaft serves both as an "input" or "output" shaft as defined in this subclass (3.22) and as a shaft defined in subclass 3.21, such occurrence is coincident rather than significant.
- (2) Note. The "means" referred to above may comprise a second clutch, or a brake, or structure to reverse the flow of fluid within the vortex-flow drive.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 730.1+ for torque reversal means inherent in a combination of fluid drive and gearing.
- 475, Planetary Gear Transmission Systems or Components, subclasses 31+, for fluid drive and control in planetary gear transmission.

3.23 With brake:

This subclass is indented under subclass 3.21. Device further provided with a brake.

- (1) Note. The term "brake" is intended to refer to that device classified, per se, in Class 188, Brakes. This subclass and this note are not intended to change the line between Class 188 and Class 192 involving Brakes and Clutches.
- (2) Note. For a line between Classes 188 and 192 with respect to a patent to a vortex-flow drive plus a brake, without a clutch, see (2) Note to subclass 3.34 below.

3.24 Alternatively operative clutch and brake:

This subclass is indented under subclass 3.23. Device wherein either the clutch or the brake (but not both simultaneously) is in functioning relationship.

- (1) Note. For the purposes of this subclass (3.24) a clutch is “functioning” when it is effective to transmit force, and a brake is “functioning” when it is effective to retard motion.

3.25 With additional drive or clutch:

This subclass is indented under subclass 3.21. Device including at least two “Vortex-Flow Drives”, or at least two clutches.

3.26 Simultaneously operative clutches:

This subclass is indented under subclass 3.25. Device including at least two clutches that are in force-transmitting, relationship at the same time.

3.27 Alternatively operative clutches:

This subclass is indented under subclass 3.25. Device including two clutches wherein either a first or a second of the clutches (but not both simultaneously) is in force-transmitting relationship.

- (1) Note. The patents in this subclass usually disclose only two clutches in combination with a vortex-flow drive. A patent claiming a vortex-flow drive and only two clutches that are alternatively operable is proper as an original patent for this subclass even though it may disclose more than two clutches.

3.28 Including drive-lockup clutch:

This subclass is indented under subclass 3.21. Device wherein engagement of the clutch causes the first, rotating shaft and the second, rotated shaft of the vortex-flow drive to be effectively secured together so that all rotation of the first shaft is transmitted to the second shaft in 1:1 ratio.

3.29 Having fluid-pressure operator:

This subclass is indented under subclass 3.28. Device provided with means for causing engagement and disengagement of the drive-

lockup clutch, which means is actuated by force applied via a liquid or gaseous medium.

- (1) Note. The fluid pressure that actuates the clutch-operator means may be derived from the toroidal flow of the vortex-flow drive or may be derived from a secondary source of fluid pressure as in subclass 3.3 hereunder.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

3.33, for a fluid-pressure operator to engage a clutch other than a drive-lockup clutch) that is combined with a vortex-flow drive.

48.601+, and 85.01+, for a fluid pressure operated clutch.

3.3 With auxiliary source of pressure:

This subclass is indented under subclass 3.29. Combination provided with means, other than the vortex-flow drive, that generates the force in the medium.

3.31 Having speed-responsive operator:

This subclass is indented under subclass 3.28. Device provided with means for causing engagement and disengagement of the clutch and wherein the means is actuated upon the attainment of a predetermined angular velocity of one of the shafts of the vortex-flow drive.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

3.33, for a fluid-pressure operator which may be inherently speed-responsive, and see (1) Note there.

3.32 Alternatively operative drive and clutch:

This subclass is indented under subclass 3.21. Device wherein either the vortex-flow drive or the clutch (but not both simultaneously) is in force-transmitting relationship.

3.33 Fluid-pressure operator for engaging clutch:

This subclass is indented under subclass 3.21. Device provided with means for causing engagement of the clutch, which means is actuated by force applied via a liquid or gaseous medium.

- (1) Note. Many of the patents in this subclass (3.33) disclose the fluid pressure for actuating the clutch to be derived from the toroidal flow of the vortex-flow drive. It is inherent in such disclosures that the clutch engagement is speed responsive.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.29+, for a fluid-pressure operator to actuate a vortex-flow drive-lockup clutch.

3.34 VORTEX-FLOW DRIVE AND BRAKE:

This subclass is indented under subclass 3.21. Apparatus under the class definition in which the mechanism for control of power includes a brake and a device described in (1) Note of ... of this class (192).

- (1) Note. The term “brake” is intended to refer to that device classified, per se, in Class 188, Brakes. This subclass and this note are not intended to change the line between Class 188 and Class 192 involving brakes and clutches, in general. It should be further noted that Class 188 (particularly subclass 296) is the locus of patents to a “fluid brake”, wherein the structure is superficially similar to a vortex-flow drive as described in (1) Note of subclass 3.21 above. However, in the disclosures found in Class 188 subclass 296, one of the elements is fixed to its supporting structure to retard rotation of the other element.
- (2) Note. The line between this class (192) and Class 60, Power Plants is not intended to be changed as a result of the establishment of this subclass (3.34). This subclass (3.34) is intended as the locus of patents to a vortex-flow drive plus a brake applied to either the first or second shaft of such drive (as described in (1) Note of subclass 3.21). Class 60 particularly subclasses 330+ is intended as the locus of patents to a device similar to that described in that (1) Note, wherein a brake is applied to the additional, interposed element described in that (1) Note. (The interposed element is known in the art as a “reactor member”).

SEE OR SEARCH CLASS:

60, Power Plants, subclasses 330+; and see (2) Note, above.

188, Brakes, subclass 296; and see (1) Note, above.

3.51 TRANSMISSION CONTROL AND CLUTCH CONTROL:

This subclass is indented under the class definition. Device including means to determine the operational mode of a clutch structure and including means to determine the ratio of a multi-ratio motion transmitting mechanism.

3.52 Planetary transmission and coaxial clutch:

This subclass is indented under subclass 3.51. Device wherein the multi-ratio motion transmitting mechanism controlled is of the type wherein an element called a planet member rotates about an axis, which axis revolves about a second axis, in which the rotation and the revolution may or not be simultaneous; and wherein the clutch structure controlled is functional to transmit motion directly and by-pass the multi-ratio motion transmitting mechanisms.

3.53 Including separate, reversing pedal:

This subclass is indented under subclass 3.52. Device including means adapted to be engaged by the foot of an operative to determine the output of the transmission to rotate oppositely to the input.

3.54 Common control:

This subclass is indented under subclass 3.51. Device wherein the means used to determine the operational mode of the clutch is also used to determine the ratio of the transmission.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.63, for structure including a clutch control and a transmission control interrelated so that one must be in a prescribed position before the other will function.

3.55 Power-operated clutch:

This subclass is indented under subclass 3.54. Device wherein a clutch member is moved relative to a cooperating member into or out of motion transmitting engagement therewith by

- energy originating at a source other than an operative.
- 3.56 Electromagnetically operated:**
This subclass is indented under subclass 3.55. Device wherein the clutch member is moved relative to the cooperating member by the attracting force of an electrically induced magnetic field in one member acting on ferrous-like material in the other member (or on structure connected to the members).
- 3.57 Fluid-press operated:**
This subclass is indented under subclass 3.55. Device wherein the clutch member is moved relative to the cooperating member by the action of a pressurized flowable medium acting on one of the members (or on structure connected thereto).
- 3.58 Electrically triggered:**
Device under 3.57 including structure for conducting electrical current which is regulated responsive to the mode/ratio determining means to, in turn, regulate the flow of the clutch operating medium.
- 3.59 Vacuum operated:**
This subclass is indented under subclass 3.57. Device including provision to reduce the pressure on a portion of one of the members (or structure connected thereto) so that atmospheric pressure serves to moves that member relatively to the other member.
- 3.61 Stepped ratio transmission:**
This subclass is indented under subclass 3.54. Device wherein the multi-ratio motion transmitting mechanism is of a type capable of operation in a limited number of specific, exactly proportional relationships.
- 3.62 With control lever:**
This subclass is indented under subclass 3.61. Device wherein the common control includes means adapted to be gripped by the hand of an operator.
- 3.63 Interrelated (e.g., with interlock):**
This subclass is indented under subclass 3.51. Device wherein the operation of one of the control means is dependent on the operational characteristics of the other control means.
- 12 CLUTCH AND BRAKE:**
This subclass is indented under the class definition. Mechanism in which a clutch or brake is applied alternately to drive and retard or stop the mechanism.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
223.1, through 223.4, where the brake is applied automatically on the breaking of a belt.
- SEE OR SEARCH CLASS:
188, Brakes, subclass 291 for a fluid-resistance brake having a clutch between the brake and a rotating load to connect and disconnect the brake from the load.
254, Implements or Apparatus for Applying Pushing or Pulling Force, subclasses 300, 318, 347, and 366 for apparatus for hauling or hoisting a load, including at least one cable-pulling drum which is driven around its rotational axis by a drive having a clutch mechanism with coaxial, rotatable, relatively shiftable axially, power-transmitting components; the clutch mechanism is linked to and is operationally influenced by a frictional brake assembly which retards the rotation of the drum.
- 13 Vehicle type:**
This subclass is indented under subclass 12. Combinations of clutch and brake adapted for use in propelling and retarding vehicles.
- 14 Same member:**
This subclass is indented under subclass 12. Combinations in which the clutch and brake are the same member.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
16, for brakes which are automatically applied when drive through the clutch ceases.

- 15 Automatic check and release:**
This subclass is indented under subclass 12. Combinations in which the brake is applied automatically when drive through the clutch ceases.
- 16 Clutch and brake same member:**
This subclass is indented under subclass 15. Combinations in which the clutch and brake are the same member.
- 17 Peripheral brake:**
This subclass is indented under subclass 12. Combinations in which the brake is applied transversely to the periphery of a wheel.
- 18 Sliding operation:**
This subclass is indented under subclass 12. Combinations in which both the clutch and brake move parallel to the axis of motion.
- 19 Crank control:**
This subclass is indented under subclass 12. Combinations in which the clutch and brake are operated by the crank that drives the shaft.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
100, for follow up type clutch operators.
- 20 CLUTCH AND GEAR:**
This subclass is indented under the class definition. Clutches in which the clutch is associated with a gear that is instrumental simply in completing the operation of the clutch.
- 21 Reversing:**
This subclass is indented under subclass 20. Clutches in which the gearing completes the reversal of the clutch.
- 21.5 FIELD RESPONSIVE FRICTIONAL MEDIA TYPE:**
This subclass is indented under the class definition. Devices wherein torque is transmitted or absorbed between two relatively movable members having a medium there between and wherein the frictional characteristics of the medium are (1) augmented by, or (2) altered in response to a change in, a magnetic or an electrostatic field set up between the two members.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
84.1+, for other types of electrically actuated clutches.
- SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 92+ for electrodynamic torque transmitting clutches or brakes.
- 22 LATCH OPERATED:**
This subclass is indented under the class definition. Clutches in which the operation of a clutching or transmission member is accomplished through a latch or relatively stationary finger.
- 23 Corn-planter type:**
This subclass is indented under subclass 22. Clutches peculiarly adapted to seed-planters.
- 24 Longitudinally moving transmission member:**
This subclass is indented under subclass 22. Clutches in which a clutching member moves parallel to the axis of rotation.
- 25 Pin:**
This subclass is indented under subclass 24. Mechanism in which the clutching member is a pin.
- SEE OR SEARCH CLASS:
26, Textiles: Cloth Finishing, subclass 24 for clutches associated with cloth pulling machines.
- 26 Transversely moving transmission member:**
This subclass is indented under subclass 22. Clutches in which the clutching member moves transversely to the axis of rotation.
- 27 Ball or roller:**
This subclass is indented under subclass 26. Clutches in which the active element of the latch-operated mechanism is a ball or roller.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
45.001, for ball and roller one-way engaging automatic clutches and see the notes

thereto for other ball and roller clutches.

28 Positive:
This subclass is indented under subclass 26. Clutches in which the transversely-moving clutching member engages positively.

29 Rotating key:
This subclass is indented under subclass 28. Clutches in which the positive clutching member is a rotary approximately cylindrical member.

30 CLUTCHES:
This subclass is indented under the class definition. A power-transmitting device utilizing friction or interlocking parts for securing and releasing driving continuity as between two shafts or a pulley and a shaft or other driving and driven parts.

- (1) Note. Class 464, in subclasses 30+, has overload release couplings wherein relative rotation between coupled members continues so long as an overload condition occurs. The line between Class 464, subclasses 30+, and Class 192, subclasses 56.1+, is that Class 464 takes structure wherein relatively rotatable surfaces move with respect to each other during an overload condition; but drive through such surfaces is automatically reestablished, without an additional operation, upon correction of the overload condition. Class 192, subclasses 56.1+, requires a further operation, in addition to correcting the overload condition, to reestablish the drive; such further operation being, for example, operator assisted reengagement or reduction in rotational speed of a power input member.

SEE OR SEARCH THIS CLASS, SUBCLASS:
3.21+, for a vortex-flow drive and clutch, and especially subclasses 3.28+ for a drive-lockup clutch.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclass 55 for a significantly claimed expansible chamber motor combined

with a clutch in the output therefrom and not involving an interrelated control of the motor and clutch.

166, Wells, subclasses 237+ for well devices with clutches.

464, Rotary Shafts, Gudgeons, Housings, and Flexible Couplings for Rotary Shafts, subclasses 30+ for overload release coupling devices in accordance with the aforementioned line note.

31 Automatic:
This subclass is indented under subclass 30. Clutches which engage without manipulation upon the initiation of rotation of the parts to which they are attached.

SEE OR SEARCH CLASS:

180, Motor Vehicles, subclasses 14.1+ for clutch operations due to unusual motions of automobile tractors.

32 Manual control:
This subclass is indented under subclass 31. Clutches the action of which is initiated by manipulation, upon which the engagement is completed automatically.

SEE OR SEARCH THIS CLASS, SUBCLASS:

47, for one-way engaging automatic clutches that may be made operative or inoperative by manipulation.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 82.3+ for one-way brakes which include means whereby the brake may be rendered inoperative to prevent retrograde motion of a rotating element.

33 Definite-position release:
This subclass is indented under subclass 32. Clutches in which the clutch is disengaged at the end of a cycle.

34 Shaft thrust:
This subclass is indented under subclass 32. Clutches in which the action of engagement is completed by the thrust of the shaft.

- 35 Pilot mechanism:**
This subclass is indented under subclass 32. Clutches in which the initial action is to throw in a pilot-clutch or other pilot mechanism, which operates to effect the engagement of the main clutch.
- 36 Brake band:**
This subclass is indented under subclass 35. Clutches in which the pilot mechanism is of a brake-band type.
- 37 Transversely moving:**
This subclass is indented under subclass 32. Clutches in which the clutching parts move transversely to the axis of rotation.
- 38 Ball or roller:**
This subclass is indented under subclass 37. Clutches in which the transversely-moving clutching part is a ball or roller.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
45.001, for one-way engaging automatic clutches in which the engaging element is a ball or roller and see the notes thereto for other ball or roller clutches.
- 39 Positive:**
This subclass is indented under subclass 37. Clutches in which the transversely-moving clutching parts are positively engaged.
- 40 Electric:**
This subclass is indented under subclass 32. Clutches in which the automatic action of the clutch is controlled electrically.
- 41 One-way engaging:**
This subclass is indented under subclass 31. Clutches which engage in one direction of rotation without manipulation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.6, and 48.92, for plural clutch-assemblies including a one-way engaging clutch.
- 42 Free-engine type:**
This subclass is indented under subclass 41. Clutches designed to impart initial movement to an engine to start the same, the clutch releasing when the speed of the engine exceeds the starting-speed.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
63, for manually-controlled clutches of this type.
- 43 Reversible:**
This subclass is indented under subclass 41. Clutches adjustable to drive in either direction.
- SEE OR SEARCH CLASS:
188, Brakes, subclass 82.2 for one-way brakes in which the direction in which retrograde rotation is prevented is selectable.
- 43.1 Pivoted pawls:**
This subclass is indented under subclass 43. Clutches in which the engaging elements are pivoted pawls, each set of pawls comprising a pair of oppositely-directed pivoted pawls, which may be an integral single member.
- SEE OR SEARCH CLASS:
81, Tools, subclasses 29+ for ratchet type bit stocks.
188, Brakes, subclasses 82.7+ for one-way brakes in which there is a pivoting or flexing detent.
- SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 111+ for mechanical movements, intermittent grip type, especially subclasses 144+, for lever mounted grip units, and see (1) Note to the definition of Class 74, and subclass 144 for the line between these two subclasses.
123, Internal-Combustion Engines, subclasses 185.1+ for internal combustion engine cranking mechanisms.
188, Brakes, subclasses 82.1+, for brakes applied to elements rotating relative to stationary elements to prevent retrograde rotation while allowing forward rotation.

43.2 Slidable pawls:

This subclass is indented under subclass 43. Clutches in which the engaging elements are slidable pawls.

SEE OR SEARCH CLASS:

81, Tools, subclasses 29+, for ratchet type bit stocks.

44 Ball or roller:

This subclass is indented under subclass 43. Clutches in which the engaging elements are balls or rollers.

SEE OR SEARCH THIS CLASS, SUBCLASS:

45.001, for ball or roller one-way engaging clutches and see the notes thereto for other clutches with a ball or roller engaging element.

45.001 Ball or roller:

This subclass is indented under subclass 41. Subject matter including a rolling element that provides the driving continuity between the driving and driven parts when the power-transmitting device is engaged.

SEE OR SEARCH THIS CLASS, SUBCLASS:

27, for latch-operated clutches in which the transmitting member is a ball or roller.
38, for one-way automatic manually controlled clutches in which the clutching element is a ball or roller.
44, for reversible one-way clutches in which the clutching element is a ball or roller.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 162 through 169 for intermittent grip devices.
188, Brakes, subclass 82.84 for one-way brakes in which the engaging element rolls into jamming position between converging surfaces, one of which is the rotating element to exert a braking force.

45.002 Roller has non-spherical, non-cylindrical force transmitting surface:

This subclass is indented under subclass 45.001. Subject matter in which the rolling element has a rolling surface that is other than spherical and cylindrical.

45.003 Plural ball or roller sizes or shapes:

This subclass is indented under subclass 45.001. Subject matter in which the rolling element is one of a plurality of rolling elements that provide the driving continuity and in which at least two of the rolling elements differ in geometry.

45.004 Plural balls or rollers of same shape and size:

This subclass is indented under subclass 45.001. Subject matter in which the rolling element is one of a plurality of substantially identical rolling elements that provide the driving continuity.

45.005 Received in recesses in each of two cooperating clutch races:

This subclass is indented under subclass 45.004. Subject matter in which the power-transmitting device includes two rolling surface elements (i.e., races) on which the rolling elements roll connected in power transmitting relationship with the driving and driven parts, the rolling surface elements being rotatable relative to each other when the power-transmitting device is disengaged and each rolling surface element having a recess for receiving one of the rolling elements.

45.006 Including cage:

This subclass is indented under subclass 45.004. Subject matter including a spacing device (i.e., cage) that limits relative movement between the rolling elements, the spacing device being separate from (i.e., not integrally formed with) rolling surface elements (i.e., races) on which the rolling elements roll connected in power transmitting relationship with the driving and driven parts, the spacing device being arranged outside the force path between the rolling surface elements and rolling elements when there is driving continuity between the driving and driven parts.

- (1) Note. The spacing device (i.e., cage) may restrict relative circumferential movement, for example, by having portions extending between successive rolling elements or the spacing device and the rolling elements may have recesses and cooperating projections forming axles received in the recesses. A retaining ring that merely restricts displacement of rolling elements axially of the rolling surface elements is not considered a spacing device for this subclass.

45.007 Including axle for ball or roller:

This subclass is indented under subclass 45.006. Subject matter in which the rolling elements have projections engageable by the spacing device or in which the spacing device has projections received in central recesses in the rolling elements so as to restrict movement of the rolling elements relative to the spacing device.

45.008 Balls or rollers spring biased toward engaged state:

This subclass is indented under subclass 45.006. Subject matter including a spring that urges at least one of the rolling elements into a position in which the power-transmitting device is engaged.

- (1) Note. The rolling element may be biased by direct engagement with the spring or may be indirectly biased, e.g., by engagement with a spring biased spacing device, etc.

45.009 Including speed-responsive biasing mechanism:

This subclass is indented under subclass 45.008. Subject matter including a mechanism in addition to the spring that applies a force to one or more of the rolling elements that is dependent upon speed of rotation of the power-transmitting device.

- (1) Note. This subclass includes devices that utilize forces that are dependent upon rotation of the power transmitting device to cause or ensure clutch engagement or to compensate for the effect of rotation-dependent forces on the rolling elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

103+, for a speed responsive clutch operator.

45.01 Biased cage:

This subclass is indented under subclass 45.008. Subject matter in which the spring acts on the rolling element(s) urged thereby through the spacing device by biasing the spacing device relative to one of the rolling surface elements.

45.011 Including bearing block between clutch races and between balls or rollers:

This subclass is indented under subclass 45.008. Subject matter including a bearing structure located between the rolling surface elements and circumferentially between at least two of the rolling elements, the bearing structure including a bearing surface supporting a load applied by one of the rolling surface elements toward the other.

- (1) Note. Included in this subclass are bearing structures that maintain spacing between the rolling surface elements i.e., (races).

45.012 Spring integrally formed with cage:

This subclass is indented under subclass 45.008. Subject matter in which the spring is integrally formed with the spacing device.

45.013 Plural integral springs separate from cage:

This subclass is indented under subclass 45.008. Subject matter in which the spring is one of a plurality of integrally formed springs that are separate from the spacing device.

45.014 Spring and multipart cage:

This subclass is indented under subclass 45.008. Subject matter in which the spacing device includes a plurality of members that are not integrally formed with each other.

45.015 Spring mounted on projection on cage:

This subclass is indented under subclass 45.008. Subject matter including a protrusion on the spacing device which provides support for the spring.

- the rotating element to cause a braking.
- 45.016 Serpentine spring:**
This subclass is indented under subclass 45.008. Subject matter in which the spring is sinuous or wave-like in shape.
- 45.017 Including separating means on clutch race:**
This subclass is indented under subclass 45.004. Subject matter in which a confining structure is formed integrally with a rolling surface element (i.e., race) on which the rolling elements roll connected in power transmitting relationship with the driving or driven part, the confining structure limiting movement of the rolling elements relative to the rolling surface element and preventing contact between at least two of the rolling elements.
- 45.018 Spring biased ball or roller:**
This subclass is indented under subclass 45.017. Subject matter including a spring that urges at least one of the rolling elements into a position in which the power-transmitting device is engaged.
- 45.019 By other than circular helical spring:**
This subclass is indented under subclass 45.018. Subject matter in which the spring has a form that differs from a helix or spiral coil lying on an imaginary cylindrical surface.
- 45.02 Including separate force transmitting element between spring and ball, roller, or race:**
This subclass is indented under subclass 45.018. Subject matter including an intermediate element arranged in the force transmission path between the spring and the rolling surface element or between the spring and the rolling element(s) urged by the spring.
- 45.1 Wedging pawl or block:**
This subclass is indented under subclass 41. Clutches in which the engaging element is a wedging pawl or block.
- SEE OR SEARCH CLASS:
188, Brakes, subclasses 82.7+ for one-way brakes employing a pivoting or flexing detent, and subclasses 82.8+ for one-way brakes in which retrograde rotation of a rotating element forces a member in jamming position between converging surfaces one of which is
- 45.2 Two-point gripper:**
This subclass is indented under subclass 41. Clutches in which the engaging element has a two-point frictional gripping contact.
- 46 Positive:**
This subclass is indented under subclass 41. Clutches which positively engage.
- SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 111+ for mechanical movements, intermittent grip type.
- 47 Manual control:**
This subclass is indented under subclass 41. Clutches that may be made operative or inoperative by manipulation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
32+, for automatic clutches in which the action is initiated by manipulation upon which the engagement is completed automatically.
- SEE OR SEARCH CLASS:
188, Brakes, subclass 82.3 for one-way brakes with means by which it may be rendered inoperative to prevent retrograde motion of rotating element.
- 48.1 Plural clutch-assemblages:**
This subclass is indented under subclass 30. Mechanism provided with at least two clutch-assemblages associated together to transmit rotation from at least one rotating input shaft to at least one rotatable output shaft.
- (1) Note. A clutch-assembly comprises all the parts that cooperate together to (a) connect a rotating "input" shaft (or a pulley, drum, flywheel, gear or other equivalent torque-transmitting member) to a rotatable "output" shaft (or hub, pulley, gear or other equivalent torque-transmitting member) that is coaxial with and driven by the input shaft, or (b) disconnect said shafts from rotational relationship, either action being performed at the will of the user of the clutch-assembly.

Although any clutch-assembly is by itself a distinct entity and is capable of transmitting rotation from an input shaft to an output shaft, different clutch-assemblies may have parts in common. That is, a part may form one of the components of a first clutch-assembly at one time, and that part may also form one of the components of a second clutch-assembly at another time. An example of a use for such an arrangement is a machine having an input shaft that may be clutched selectively to any of a plurality of output shafts by using a shiftable clutch-element first in one clutch-assembly and then in another clutch-assembly. See subclass 48.91 for such an arrangement. Another common arrangement is a first clutch-assembly having an output shaft that is also the input shaft of a second clutch-assembly in "series" relationship.

- (2) Note. The term "clutch-element" as used in this and indented subclasses has the same meaning as the term defined and described in the definition and notes of subclass 70.11 below. However, whereas in subclass 70.11 the engaging surface is usually a friction surface, in this subclasses (48.1+) it may be a friction surface or a toothed or gear-like surface or any other surface configuration that will mate with another, complementary surface on a second clutch-element to transmit rotation between the elements having such surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.26, for a combination including a vortex-flow drive and a plurality of clutches.
35+, for a multiple-clutch arrangement in which one clutch serves as a pilot operator for the other.
57, for a combination of fluent-material clutch and mechanical clutch.

48.2 Including electrically actuated clutch assembly:

This subclass is indented under subclass 48.1. Device wherein one of the associated clutch-assemblies is provided with clutch-elements

that are mutually engaged or disengaged by electromagnetic energy.

- (1) Note. Included in the subclass are plural clutch-assemblies of which at least one is actuated by eddy currents, or by a field-responsive frictional medium, (per se, classified in subclass 21.5) or by an electrical operator, (per se, classified in subclasses 84.1+).

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 21.5, and 84.1+, and see (1) Note above.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 92+, for an eddy current clutch associated with other structure provided for in that schedule.

48.3 Diverse clutch-assemblies:

This subclass is indented under subclass 48.1. Device wherein one of the associated clutch-assemblies is different in its principle of operation from another.

- (1) Note. Examples of arrangements wherein the principle of operation is "different" include: Arrangements wherein one clutch-assembly is actuated by fluid pressure whereas another clutch-assembly is actuated by mechanical linkage; arrangements wherein one clutch-assembly uses clutch-elements that engage positively, as by splines, intermeshing teeth or ratchet-and-pawl elements, whereas another clutch-assembly uses clutch-elements that engage frictionally, as by surface-to-surface contact; and arrangements wherein one clutch-assembly is intended to function in only one direction of rotation whereas another clutch-assembly is intended to transmit all torque applied thereto in either direction of rotation. Minor differences in shape or size between the elements of clutch-assemblies, not involving differences in operation, are not justification for placement into this and indented subclasses. For example, an arrangement of clutch-assemblies wherein one has

tapered clutch-elements and another has disc clutch-elements or an arrangement of clutch-assemblages wherein one uses rollers and another uses balls, are not properly considered to be “diverse”, but will be classified in subclasses 48.11+ according to their plural characteristics.

48.4 Including three or more assemblages:

This subclass is indented under subclass 48.3. Device provided with more than two associated clutch-assemblages.

48.5 Including one clutch-assembly having interdigitated clutch-elements:

This subclass is indented under subclass 48.3. Device wherein one of the associated clutch-assemblages is provided with a clutch-element that intermeshes with a mating clutch-element to transmit torque positively (i.e., without slipping), in at least one direction of rotation, from an input shaft to an output shaft.

- (1) Note. The clutch-assembly defined above is also known as a “positive” clutch. The other clutch-assembly associated therewith in this subclass (48.5) usually has friction clutch-elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

28+, 39, 46, 69+, and 71 and for a clutch, per se, of “positive” type.

48.6 And another clutch-assembly having unrotationally engaging clutch elements:

This subclass is indented under subclass 48.5. Device wherein a second one of the associated clutch-assemblages is provided with clutch-elements that transmit torque from an input shaft to an output shaft in only one direction of rotation of the input shaft, which clutch-elements permit rotation in said direction of the output shaft relative to the input shaft.

- (1) Note. The clutch-assembly herein is also known by the terms “Overrunning clutch”, “One-way clutch” and “Free-wheeling clutch”. The purpose of such arrangement is to cause engagement of the clutch-elements when the input shaft is powered whereby the output shaft will rotate at least as fast as the input shaft,

but to permit the output shaft to rotate faster than the input shaft under certain conditions of operation.

- (2) Note. This subclass provides for two or more clutch-assemblages, one of which has positively-engaging clutch-elements and another of which has one-way-engaging clutch-elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41+, for a one-way-engaging clutch.
48.92, for plurality of one-way-engaging clutch-assemblages.

48.601 Having fluid pressure operator:

This subclass is indented under subclass 48.1. Subject matter in which the clutch-assemblages include a clutch-assembly that is actuated (i.e., caused to engage or disengage) by the action of fluid under pressure.

- (1) Note. The phrase “action of fluid under pressure” is intended to include the effects of fluid whose pressure is less than ambient or atmospheric pressure and typically referred to as “vacuum” or “partial vacuum”.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.25+, for a combination of vortex-flow drive and a plurality of clutches, wherein the clutches may be fluid-pressure operated.
3.29+, and 3.33, for a fluid-pressure operator for a clutch that is combined with a vortex-flow drive.
48.1+, for a combination of multiple clutches that are mechanically operated.
85.01+, for a clutch having a fluid-pressure operator.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, appropriate subclasses for an expansible chamber device, per se, even though disclosed as a means to operate a clutch.
303, Fluid-Pressure and Analogous Brake Systems, appropriate subclasses for systems of distribution of fluid to motors of more general application.

48.602 Operator rotatable relative to its clutch-assembly:

This subclass is indented under subclass 48.601. Subject matter in which the fluid under pressure acts through a fluid motor that is rotatable relative to both the driving and driven parts connected by the fluid-operated clutch-assembly.

48.603 Operator coaxial with its clutch-assembly:

This subclass is indented under subclass 48.602. Subject matter in which an axis along which the fluid motor acts is aligned with an axis of rotation of the fluid-operated clutch-assembly.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.611+,48.617, and 48.618+, for a clutch and coaxial actuator that may rotate with the clutch.

48.604 Common or interconnected operator(s):

This subclass is indented under subclass 48.603. Subject matter in which the fluid motor contributes to operation (engagement or disengagement) of two or more of the clutch-assemblies or in which the fluid motor and an additional fluid motor operate two or more of the clutch-assemblies and the position of an output element (e.g., piston, actuating shaft) of one of the fluid motors is dependent upon the position of an output element the other fluid motor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

3.27, for the combination of a vortex-flow drive and alternatively operative clutches that may include a common actuator or interconnected actuators.

48.612+,for common or interconnected actuator(s) that may rotate with associated clutches.

48.605 Operator between clutch-assemblies:

This subclass is indented under subclass 48.604. Subject matter in which the fluid motor is located between two of the clutch-assemblies.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.613, and 48.614, for clutches and an actuator that may rotate relative to at least one of the clutches and that is located between the clutches.

48.606 Axially spaced coaxial clutch-assemblies:

This subclass is indented under subclass 48.603. Subject matter in which two of the clutch-assemblies rotate about a common axis and have disengageable power-transmitting portions (e.g., friction surfaces), all disengageable power-transmitting portions of one of the two clutch-assemblies being axially spaced at all times from all disengageable power-transmitting portions of the other clutch-assembly.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.607, and 48.609+, for other axially spaced coaxial clutches.

48.607 Axially spaced coaxial clutch-assemblies:

This subclass is indented under subclass 48.602. Subject matter in which two of the clutch-assemblies rotate about a common axis and have disengageable power-transmitting portions (e.g., friction surfaces), all disengageable power-transmitting portions of one of the two clutch-assemblies being axially spaced at all times from all disengageable power-transmitting portions of the other clutch-assembly.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.606, and 48.609+, for other axially spaced coaxial clutches.

48.608 Plural fluid pressure operators forming nested pistons:

This subclass is indented under subclass 48.602. Subject matter in which the fluid pressure also acts through an additional fluid motor, each fluid motor having a piston movable by application of the fluid pressure thereto, the piston of one of the fluid motors forming a cylinder of the other fluid motor in which cylinder the piston of the other fluid motor is movable.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.61, and 48.616+, for other clutches having actuators forming nested pistons.

48.609 Axially spaced coaxial clutch-assemblages:
This subclass is indented under subclass 48.601. Subject matter in which two of the clutch-assemblages rotate about a common axis and have disengageable power-transmitting portions (e.g., friction surfaces), all disengageable power-transmitting portions of one of the two clutch-assemblages being axially spaced at all times from all disengageable power-transmitting portions of the other of the two clutch-assemblages.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.606, and 48.607, for other axially spaced coaxial clutches.

48.61 Plural fluid pressure operators forming nested pistons:
This subclass is indented under subclass 48.609. Subject matter including two fluid motors that actuate one or more of the clutch assemblages, each fluid motor having a piston movable by application of the fluid pressure thereto, the piston of one of the fluid motors forming a cylinder of the other fluid motor in which cylinder the piston of the other fluid motor is movable.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.608, and 48.616+, for other clutches having actuators forming nested pistons.

48.611 Operator coaxial with its clutch-assemblage:
This subclass is indented under subclass 48.609. Subject matter in which the fluid under pressure acts through a fluid motor and an axis along which the fluid motor acts is aligned with an axis of rotation of the fluid actuated clutch-assemblage.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.603+,48.617, and 48.618+, for a clutch and coaxial actuator.

48.612 Common or interconnected operator(s):
This subclass is indented under subclass 48.611. Subject matter in which the fluid motor contributes to operation (engagement or disengagement) of two of the clutch-assemblages or in which the fluid motor and an additional fluid motor operate two of the clutch-assemblages and the position of an output element (e.g., piston, actuating shaft) of one of the fluid motors is dependent upon the position of an output element the other fluid motor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.604+,for common or interconnected actuator(s) that rotate relative to associated clutch(es).
3.27, for the combination of a vortex-flow drive and alternatively operative clutches that may include a common or interconnected actuator(s).

48.613 Operator between clutch-assemblages:
This subclass is indented under subclass 48.612. Subject matter in which the fluid motor is located between the two clutch-assemblages.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.605, and 48.614, for plural clutches and an actuator located between the clutches.

48.614 Operator between clutch-assemblages:
This subclass is indented under subclass 48.611. Subject matter in which the fluid motor is located between two of the clutch-assemblages.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.605, and 48.613, for other actuators located between clutches.

48.615 Radially acting operator:
This subclass is indented under subclass 48.609. Subject matter in which the fluid under pressure acts through a fluid motor and an axis along which the fluid motor acts is substantially perpendicular to the axis of rotation of the fluid actuated clutch-assemblage.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
85.12+, 85.16, and 85.47, for a clutch operated by a radially acting fluid pressure actuator.

48.616 Plural fluid pressure operators forming nested pistons:

This subclass is indented under subclass 48.601. Subject matter in which the fluid under pressure acts through two fluid motors that actuate one or more of the clutch assemblies, each fluid motor having a piston movable by application of the fluid pressure thereto, the piston of one of the fluid motors forming a cylinder of the other fluid motor in which cylinder the piston of the other fluid motor is movable.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.608, and 48.61, for clutch actuators forming nested pistons.

48.617 At least one operator coaxial with its clutch-assembly:

This subclass is indented under subclass 48.616. Subject matter in which at least one of the fluid motors acts along an axis that is aligned with an axis of rotation of (one of) the clutch-assembly(s) it actuates.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.603+,48.611+, and 48.618+, for a clutch and coaxial actuator.

48.618 Operator coaxial with its clutch-assembly:

This subclass is indented under subclass 48.601. Subject matter in which the fluid under pressure acts through a fluid motor to actuate the clutch-assembly and an axis along which the fluid motor acts is aligned with an axis of rotation of the clutch-assembly.

SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.603+,48.611+, and 48.617, for a clutch and coaxial actuator.

48.619 Radially spaced coaxial clutch-assemblies:

This subclass is indented under subclass 48.618. Subject matter in which the clutch-assemblies include two clutch-assemblies having the same axis of rotation and having disengageable power-transmitting portions (e.g., friction surfaces), the clutch-assemblies being arranged such that a plane perpendicular to the axis of rotation passes through or between at least one disengageable power-transmitting portion of each of the two clutch-assemblies.

48.7 With means to actuate or deactuate clutch-assemblies sequentially:

This subclass is indented under subclass 48.1. Device wherein two or more clutch-assemblies are intended to be operative simultaneously as a set, provided with means to ensure that one clutch-assembly of said set has its clutch-elements fully engaged before another clutch-assembly of said set has its clutch-elements engaged, or with means to ensure that one clutch-assembly of said set has its clutch-elements fully disengaged before another clutch-assembly of said set has its clutch-elements disengaged.

- (1) Note. The set of clutch-assemblies described above permits torque from an input shaft to be applied to an output shaft in stages, or progressively, in order to reduce stress or shock attendant upon a sudden application of load.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52.1+, and 70.21, for other arrangements for progressively transmitting load from an input to an output shaft.

48.8 Associated with three or more shafts:

This subclass is indented under subclass 48.1. Device wherein the clutch-assemblies are provided with more than two shafts for input or output of torque, in any combination of one (or more) input shaft (s) plus two (or more) output shafts, or of two (or more) output shafts plus one (or more) output shaft (s).

- (1) Note. For the purposes of this and indented subclasses, a shaft is a rotating member that transmits torque; thus a

gear, pulley, drum, hub, etc., is equivalent to a shaft. An input shaft is such a member that is rotated by a source of power external to the device, and an output shaft is such a member that (a) is rotated by the claimed device AND (b) rotates a torque-using mechanism external to the claimed device. Thus, if there are rotating members that transmit torque between the input and output shafts within the device they are not counted in the number "three or more" required for these subclasses.

48.9 Alternatively operative assemblages:

This subclass is indented under subclass 48.8. Device wherein either a first or a second of the clutch-assemblages (but not both simultaneously) is in torque-transmitting relationship.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.27, for the combination of a vortex-flow drive and alternatively operative clutches.

48.604+, and 48.612+, for multiple fluid clutches having a common actuator that may allow only alternate engagement of the clutches.

48.91 Having common clutch-element support:

This subclass is indented under subclass 48.9. Device wherein a member rigidly carries one of the clutch-elements of the first clutch-assemblage and the same member rigidly carries one of the clutch-elements of the second clutch-assemblage.

48.92 Including unirotationally engaging clutch-elements:

This subclass is indented under subclass 48.1. Device wherein at least one of the associated clutch-assemblages is provided with clutch-elements that transmit torque from an input shaft to an output shaft in only one direction of rotation of the input shaft, which clutch-elements permit rotation in said direction of the output shaft relative to the input shaft.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41+, for a one-way-engaging clutch.

48.6, for an arrangement of a one-way-engaging clutch-assemblage and a "positive" clutch-assemblage.

49 Parallel vehicle wheels:

This subclass is indented under subclass 48.1. Clutches associated to operate in connection with parallel vehicle-wheels.

SEE OR SEARCH CLASS:

280, Land Vehicles, subclass 192, for clutches driven by vehicle wheels and driving a winding drum used in controlling the vehicle.

50 Free wheel:

This subclass is indented under subclass 49. Clutches associated to operate in connection with parallel vehicle-wheels, permitting either wheel to overrun.

51 Reversing:

This subclass is indented under subclass 48.1. Clutches instrumental in accomplishing the reversal of rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

21, for clutches associated with gearing to accomplish a reversal in rotation.

52.1 Progressive engagement:

This subclass is indented under subclass 30. Subject matter wherein means are provided specifically to cause clutch elements to engage gradually.

SEE OR SEARCH THIS CLASS, SUBCLASS:

48.7, for an arrangement of two or more clutch-assemblages that engage (or disengage) progressively or in succession, thus transmitting (or releasing) torque progressively from an input shaft to an output shaft.

70.21, for a multiple-element clutch wherein the elements engage (or disengage) sequentially.

52.2 Surface area:

This subclass is indented under subclass 52.1. Subject matter wherein the amount of surface area of one clutch element in engagement with

a second clutch element increases as the elements move toward full engagement.

52.3 Yielding:

This subclass is indented under subclass 52.2. Subject matter wherein at least one clutch element deforms as a result of engagement to cause an increase in the engaging surface area.

52.4 Variable force:

This subclass is indented under subclass 52.1. Subject matter wherein an engaging force is changed during clutch engagement in order to provide gradual engagement of the clutch.

52.5 Initial engagement causes increase in applied force:

This subclass is indented under subclass 52.4. Subject matter wherein initial clutch engagement causes relative rotation of a mechanism to increase the applied force.

52.6 Yielding:

This subclass is indented under subclass 52.1. Subject matter wherein at least one clutch element deforms as a result of engagement to cause gradual engagement while the contacting surface area remains constant.

SEE OR SEARCH THIS CLASS, SUBCLASS:

107, for a subcombination of a clutch which is axially compressible.

53.1 Frictional and positive:

This subclass is indented under subclass 52.1. Subject matter wherein after a preliminary slipping engagement of friction elements, positive clutch elements intermesh to transmit torque without slip.

SEE OR SEARCH CLASS:

188, Brakes, subclass 68, for similar action in brakes.

53.2 Magnetic or electromagnetic operated friction clutch:

This subclass is indented under subclass 53.1. Subject matter wherein the slipping engagement is produced by the force of a magnet or electromagnet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

84+, for clutches engaged by electromagnetic force.

53.3 With blocker:

This subclass is indented under subclass 53.1. Subject matter wherein structure is provided to resist or delay movement of a shiftable positive clutch element into full engagement to facilitate synchronization.

(1) Note. Clutches in subclasses 53.3+ are typically synchronizer clutches for use in transmissions to facilitate shifting from one gear ratio to another, and classification in these subclasses is proper even if one clutch element is claimed as a gear.

(2) Note. Where parallel transmission shafts and cooperating gears are claimed, classification in Class 74, subclasses 325+ is proper.

53.31 Self-energizing:

This subclass is indented under subclass 53.3. Subject matter wherein a cam structure is provided to increase the clamping force of friction elements after an initial engagement of the friction elements.

53.32 Interposed friction member:

This subclass is indented under subclass 53.3. Subject matter wherein frictional engagement is provided by at least three friction elements with at least one friction element being sandwiched between adjacent elements.

(1) Note. The friction elements here are generally in the form of discs or frustocones.

SEE OR SEARCH THIS CLASS, SUBCLASS:

70.11+, for a multiple friction element clutch assemblage, per se.

53.33 Member extending axially between friction surfaces:

This subclass is indented under subclass 53.3. Subject matter wherein there are plural friction elements connected to at least one axially extending member which cooperates with a

radially extending portion of a shift sleeve to perform a blocking function.

53.331 Blocker on axially extending stepped pin:

This subclass is indented under subclass 53.33. Subject matter wherein at least one axially extending member has a substantially circular cross-section and the cross-section has a diameter that varies along the length of the axially extending member.

53.332 Resilient detent pin:

This subclass is indented under subclass 53.331. Subject matter further including at least one axially extending resilient member offset circumferentially from the stepped pin to cooperate with an opening in the shift sleeve to define at least one position of the shift sleeve.

- (1) Note. These members are typically themselves yieldable or are made up of separate sections biased apart by a distinct resilient element.

53.34 Outward tooth or lug on friction member:

This subclass is indented under subclass 53.3. Subject matter wherein the blocker includes at least one lug or tooth carried by a friction element in which said lug or tooth projects radially outward of the rotational axis.

53.341 With thrust member:

This subclass is indented under subclass 53.34. Subject matter wherein the shiftable positive clutch element carries a keylike strut member for imparting axial force to the friction element.

53.342 Resilient thrust bar:

This subclass is indented under subclass 53.341. Subject matter wherein the keylike strut member is made of a yieldable material.

53.343 Resilient expander ring:

This subclass is indented under subclass 53.341. Subject matter wherein the keylike strut member is biased radially outward relative to the rotation axis by at least one substantially circular spring ring.

53.35 Inward tooth or lug on friction member:

This subclass is indented under subclass 53.3. Subject matter wherein the blocker includes at least one lug or tooth carried by the friction ele-

ment in which said lug or tooth projects radially toward the rotational axis.

53.36 Radially movable blocker:

This subclass is indented under subclass 53.3. Subject matter wherein the blocker has a component of movement which is transverse or oblique to the axis of rotation to allow the shiftable positive clutch element to pass into its engaged position.

53.361 Detent acts as blocker:

This subclass is indented under subclass 53.3. Subject matter wherein the radially movable blocker comprises structure which is provided to define a disengaged position of the shiftable positive clutch element.

53.362 Rocker lever actuates friction clutch:

This subclass is indented under subclass 53.361. Subject matter wherein the detent is formed by or carried by a generally radially disposed pin which is pivotally mounted at its radially inner end to an input or output shaft and is releasably connected at its radially outer end to the shiftable positive clutch element; and wherein axial movement of the shiftable element causes the pin to tilt and force frictional surfaces into engagement; further shifting of the element, and engagement of the positive clutch elements, being resisted by the releasable connection until synchronization is achieved.

53.363 Radially movable friction element acts as blocker:

This subclass is indented under subclass 53.36. Subject matter wherein one of the friction elements has a component of movement transverse to the axis of rotation to allow the shiftable positive clutch element to pass into its engaged position.

53.364 Resilient friction element:

This subclass is indented under subclass 53.363. Subject matter wherein the transversely moving friction element is formed by a resilient ringlike member substantially concentric to the clutch rotational axis.

53.4 Lock for positive clutch:

This subclass is indented under subclass 53.1. Subject matter wherein structure is provided to prevent inadvertent disengagement of the intermeshed positive elements.

- (1) Note. The structure here can be the configuration of the positive clutch teeth or a separate device to maintain the positive clutch in engagement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

114+, for element-locking means, per se.

53.5 Axially projecting positive clutch:

This subclass is indented under subclass 53.1. Subject matter wherein at least one of the positive clutch elements includes at least one tooth or lug projecting axially from an end face thereof.

- (1) Note. Devices in this subclass do not include a blocker.

SEE OR SEARCH THIS CLASS, SUBCLASS:

69+, for axially engaging positive clutches, per se.

53.51 Cylindrical pin:

This subclass is indented under subclass 53.5. Subject matter wherein the tooth or lug has a substantially circular cross-sectional shape.

53.6 Transversely moving positive clutch:

This subclass is indented under subclass 53.1. Subject matter wherein at least one of the positive clutch elements has a component of engaging movement transverse to the axis of rotation.

- (1) Note. Devices in this subclass do not include a blocker.

SEE OR SEARCH THIS CLASS, SUBCLASS:

71, for transversely engaging clutches, per se.

54.1 Torque responsive:

This subclass is indented under subclass 30. Subject matter wherein the transmission of torque from a clutch input shaft to a clutch output shaft is affected by the torsional strain on one of the shafts.

- (1) Note. Class 464, in subclasses 30+, has overload release couplings wherein relative rotation between coupled members continues so long as an overload condition occurs. The line between Class 464, subclasses 30+, and Class 192, subclasses 56.1+, is that Class 464 takes structure wherein relatively rotatable surfaces move with respect to each other during an overload condition; but drive through such surfaces is automatically reestablished, without an additional operation, upon correction of the overload condition. Class 192, subclasses 56.1+, requires a further operation, in addition to correcting the overload condition, to reestablish the drive; such further operation being, for example, operator assisted reengagement or reduction in rotational speed of a power input member.

54.2 Hub clutch:

This subclass is indented under subclass 54.1. Subject matter wherein the clutch engages a wheel hub to a selectively driven axle (e.g., in a four-wheel drive vehicle).

SEE OR SEARCH THIS CLASS, SUBCLASS:

69.4, for positive engaging wheel hub clutches, per se.

54.3 Fluid operated:

This subclass is indented under subclass 54.1. Subject matter wherein the clutch is moved either to an engaged or disengaged position by hydraulic or pneumatic pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

48.601+, and 85.01+, for fluid pressure operators, per se.

54.4 Magnetic or electromagnetic:

This subclass is indented under subclass 54.1. Subject matter wherein the clutch is moved either to an engaged or disengaged position by a permanent magnet or an electromagnetic coil.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

84+, for a magnetic or electromagnetic operator, per se.

54.5 Cam operated:

This subclass is indented under subclass 54.1. Subject matter wherein the torsional strain causes movement of an inclined surface relative to a cooperating structure to affect engagement of the clutch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

93+, for a cam operator, per se.

54.51 Screw operated:

This subclass is indented under subclass 54.5. Subject matter wherein the torsional strain causes movement of a helical thread spline relative to a cooperating structure to affect engagement of the clutch.

54.52 Ball or roller type:

This subclass is indented under subclass 54.5. Subject matter wherein the inclined surface contacts a sphere or cylinder.

55.1 With overload release coupling:

This subclass is indented under subclass 54.1. Subject matter having structure in the torque transmission path which permits continuous relative rotation between the input and output shafts, without disengaging the clutch upon occurrence of a torque overload.

- (1) Note. This subclass includes the combination of a selectively engageable clutch and an overload slip coupling.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52.3, and 52.6, for clutches in which one element yields as the clutch engages to cause gradual engagement.

56.1+, for clutches which disengage upon overload.

SEE OR SEARCH CLASS:

464, Rotary Shafts, Gudgeons, Housings and Flexible Couplings for Rotary Shafts, subclasses 30+, for a flexible coupling wherein means is provided for transmitting torque between input and output members so as to accommodate relative rotation between said members when resistance to rotation of said output member exceeds a predetermined value, said means including either (a) a device which is designed to rupture when said resistance to rotation exceeds said predetermined value, or (b) a device which slips or disengages when said resistance to rotation exceeds said predetermined value but which automatically reengages without operator intervention or other additional operation when said resistance to rotation no longer exceeds said predetermined value.

55.2 With flexible shaft coupling permitting limited relative rotation:

This subclass is indented under subclass 54.1. Subject matter having structure in the torque transmission path which permits limited relative rotation between the input and output shafts in order to absorb torque variations.

- (1) Note. This subclass and subclasses indented thereunder include the combination of a selectively engageable clutch and a flexible shaft coupling. Classification in this subclass requires more than mere nominal recitation of a clutch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70.17, for clutches having interposed mating clutch elements including recoilably yieldable means permitting a limited degree of variation between the rotation of a shaft and the rotation of a member supported thereby.

200+, for a subcombination comprising a clutch element resiliently mounted on a hub.

- SEE OR SEARCH CLASS:
464, Rotary Shafts, Gudgeons, Housings and Flexible Couplings for Rotary Shafts, appropriate subclasses for flexible shaft couplings, per se.
- 55.3 Separate resilient member between clutch element and its shaft:**
This subclass is indented under subclass 55.2. Subject matter wherein the structure which permits limited relative rotation is a coupling separate from the engaging clutch elements and includes at least one resiliently yieldable member.
- 55.4 Fluid damper:**
This subclass is indented under subclass 55.3. Subject matter wherein the resilience of the resiliently yieldable member or members is provided by compressing a liquid or gas or by forcing a liquid or gas through a restriction (e.g., a dashpot).
- 55.5 Coil spring coaxial with rotation axis:**
This subclass is indented under subclass 55.3. Subject matter wherein at least one yieldable member is comprised of an elongated elastic element coiled about a center line which substantially coincides with the axis of the clutch.
- 55.51 Radially overlapping convolutions:**
This subclass is indented under subclass 55.5. Subject matter wherein the coils of the elongated element overlies each other substantially in a plane transverse to the rotational axis of the clutch.
- 55.6 Plural resilient members:**
This subclass is indented under subclass 55.3. Subject matter including plural resiliently yieldable members.
- 55.61 Coil springs with center line spaced from rotational axis:**
This subclass is indented under subclass 55.6. Subject matter wherein each of the resiliently yieldable members is comprised of an elongated elastic element coiled about a center line other than the rotational axis of the clutch.
- 55.62 Center line of coil springs parallel to rotational axis:**
This subclass is indented under subclass 55.61. Subject matter wherein each of the elongated resilient or elastic members is coiled about a center line that is substantially parallel to the rotational axis of the clutch.
- 55.7 Coil spring with center line spaced from rotational axis:**
This subclass is indented under subclass 55.3. Subject matter wherein there is a single resiliently yieldable member comprised of an elongated resilient or elastic element coiled about a center line other than the rotational axis of the clutch.
- 56.1 Overload release:**
This subclass is indented under subclass 54.1. Subject matter wherein engaged clutch elements, coupling input and output shafts of a selectively engageable clutch, release or slip when subjected to an excessive torsional strain on one of the shafts.
- (1) Note. See the line note in subclass 54.1 for the line between Class 192 and Class 464.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
55.1, for structure in the drive-line of the clutch which slips on overload while the clutch remains engaged (e.g., the combination of a clutch and overload coupling).
- SEE OR SEARCH CLASS:
464, Rotary Shafts, Gudgeons, Housings, and Flexible Couplings for Rotary Shafts, subclasses 32+ for structure wherein torque transmission is disrupted by breakage of a frangible element that may be replaced.
- 56.2 Coil:**
This subclass is indented under subclass 56.1. Subject matter wherein one of the clutch elements is a helically coiled resilient device which frictionally engages the other clutch element to transmit torque.

- 56.3 Fluid operated clutch:**
This subclass is indented under subclass 56.1. Subject matter wherein the clutch elements are moved to or held in either an engaged or released condition by means of a liquid or gas under pressure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
48.601+, and 85.01+, for fluid activated clutches, per se.
- 56.31 Axially engaged:**
This subclass is indented under subclass 56.3. Subject matter wherein movement of the clutch elements to the engaged condition is in a direction parallel to the rotation axis of the clutch.
- 56.32 Positive:**
This subclass is indented under subclass 56.31. Subject matter wherein the clutch elements have formations thereon which intermesh to transmit torque without slip.
- 56.33 Ball or roller:**
This subclass is indented under subclass 56.32. Subject matter wherein at least one of the formations is a spherical or generally cylindrical member.
- 56.4 Magnetic or electromagnetic:**
This subclass is indented under subclass 56.1. Subject matter wherein the clutch elements are moved to or held in either an engaged or released condition by means of at least one permanent magnet or electromagnetic coil.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
84+, for magnetically or electromagnetically operated clutches, per se.
- 56.41 Axially engaged:**
This subclass is indented under subclass 56.4. Subject matter wherein movement of the clutch elements to the engaged condition is in a direction parallel to the rotation axis of the clutch.
- 56.42 Positive:**
This subclass is indented under subclass 56.41. Subject matter wherein the clutch elements have formations thereon which intermesh to transmit torque without slip.
- 56.43 Ball or roller:**
This subclass is indented under subclass 56.42. Subject matter wherein at least one of the formations is a spherical or generally cylindrical member.
- 56.5 Clutch elements remain disengaged after overload corrected:**
This subclass is indented under subclass 56.1. Subject matter wherein the clutch elements release from engagement when subjected to excessive torsional strain and remain released after the excessive torsional strain is reduced.
- 56.51 Having separate latch to hold clutch elements disengaged:**
This subclass is indented under subclass 56.5. Subject matter having a spring biased detent or pivoted pawl which positively engages another member to prevent the clutch elements from reengaging until reset by an operator.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
114, for locking devices, per se.
150, for overload release mechanism, per se.
- 56.52 Axially engaged:**
This subclass is indented under subclass 56.51. Subject matter wherein movement of the clutch elements to the engaged condition is in a direction parallel to the rotation axis of the clutch.
- 56.53 Positive:**
This subclass is indented under subclass 56.52. Subject matter wherein the clutch elements have formations thereon which intermesh to transmit torque without slip.
- 56.54 Ball or roller:**
This subclass is indented under subclass 56.53. Subject matter wherein at least one of the formations is a spherical or generally cylindrical member.
- 56.55 Axially engaged:**
This subclass is indented under subclass 56.5. Subject matter wherein movement of the clutch elements to the engaged condition is in a direction parallel to the rotation axis of the clutch.

56.56 Positive:

This subclass is indented under subclass 56.55. Subject matter wherein the clutch elements have formations thereon which intermesh to transmit torque without slip.

56.57 Ball or roller:

This subclass is indented under subclass 56.56. Subject matter wherein at least one of the formations is a spherical or generally cylindrical member.

56.6 Axially engaged:

This subclass is indented under subclass 56.1. Subject matter wherein movement of the clutch elements to the engaged condition is in a direction parallel to the rotation axis of the clutch.

56.61 Positive:

This subclass is indented under subclass 56.6. Subject matter wherein the clutch elements have formations thereon which intermesh to transmit torque without slip.

56.62 Ball or roller:

This subclass is indented under subclass 56.61. Subject matter wherein at least one of the formations is a spherical or generally cylindrical member.

57 Fluent material and mechanical:

This subclass is indented under subclass 30. Clutches include an ordinary friction or other mechanically clutching part combined with a clutch in which the resisting part is enveloped in the clutching material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.21+, for a combination of vortex-flow drive and clutch.

48.1+, for other plural clutch-assemblages.

SEE OR SEARCH CLASS:

188, Brakes, subclass 271 for a surface-friction brake combined with a fluid-resistance brake.

58.1 Fluent material:

This subclass is indented under subclass 30. Subject matter in which a clutching medium envelopes at least one of a pair of clutch mem-

bers and is a fluid or any substance the particles of which readily flow over each other.

SEE OR SEARCH CLASS:

60, Power Plants, subclasses 330+ for fluid couplings which include the transmission of torque through kinetic forces resulting from acceleration and deceleration of the fluid effective between the driving and driven elements of the coupling. Where the driven element includes a fluid channel or space between vanes which communicates with regions of the driving element which are maintained at different fluid pressures or are moving at different velocities, the resulting forces are considered kinetic and such structures are found in Class 60.

188, Brakes, subclasses 266+ for a similar structure used as a brake.

464, Rotary Shafts, Gudgeons, Housings and Flexible Couplings for Rotary Shafts, subclasses 24+ for a flexible coupling wherein a liquid or gas is used to affect the coupling, and see the line note with Class 192 under the class definition of Class 464.

58.2 Fluid:

This subclass is indented under subclass 58.1. Subject matter wherein the clutching medium is a liquid or a gas.

(1) Note. Where the clutching medium is not a liquid or gas (e.g., a powder or gellike plastic fluid mass) classification is proper in subclass 58.1.

58.3 Vane clutch:

This subclass is indented under subclass 58.2. Subject matter wherein at least one of the members is provided with a projection acting as a scoop or paddle which propels the clutching medium against the other of the members to transmit torque therebetween.

58.4 Viscous shear:

This subclass is indented under subclass 58.2. Subject matter wherein torque is transmitted by fluid friction acting on surfaces of the clutch members.

58.41 Multiple plate:

This subclass is indented under subclass 58.4. Subject matter wherein there is a plurality of disclike elements on one clutch member interleaved with a plurality of disclike elements on the other of the clutch members.

58.42 Variable gap or volume:

This subclass is indented under subclass 58.4. Subject matter wherein means are provided for adjusting the spacing between the disclike elements or for adjusting the volume of a chamber in which the liquid or gas is contained.

58.43 Variable gap or volume:

This subclass is indented under subclass 58.4. Subject matter wherein means are provided for adjusting the spacing of the surfaces of the clutch members or adjusting the volume of a chamber in which the liquid or gas is contained.

58.5 Separate reservoir:

This subclass is indented under subclass 58.4. Subject matter wherein one of the clutch members rotates in a space defined by a housing, which housing has a working chamber in which fluid friction between the members occurs and wherein a separate storage chamber is provided in which the liquid or gas can be collected.

(1) Note. The housing referred to above may be defined by the other of the members; e.g., a housing is coupled to a part to be driven and a disc rotatable in the housing is coupled to a driving part.

58.6 Automatic regulation:

This subclass is indented under subclass 58.5. Subject matter wherein means are provided to control the flow of fluid between the working chamber and the storage chamber in response to at least one sensed condition.

58.61 Magnetic or electric:

This subclass is indented under subclass 58.6. Subject matter wherein the means which controls the flow between chambers is magnetically or electrically operated.

58.62 Temperature and speed:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition includes both a level of heat and a rate of rotation.

58.63 Temperature:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition is a level of heat.

58.64 Coolant and clutching medium:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition is a level of heat in the clutching medium and the level of heat in a separate liquid used to cool a related device.

(1) Note. The related device is typically an internal combustion engine.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 41.12, for similar devices in combination with an internal combustion engine.

58.65 Ambient and clutching medium:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition is a level of heat in the clutching medium and the level of heat of air external to and immediately surrounding the clutch.

58.66 Ambient and coolant:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition is a level of heat in air external to and immediately surrounding the clutch and the level of heat in a separate liquid used to cool a related device.

58.67 Clutching medium:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition is the level of heat in the clutching medium.

58.68 Ambient:

This subclass is indented under subclass 58.6. Subject matter wherein the sensed condition is the level of heat in air external to and immediately surrounding the clutch.

58.681 Bimetallic:

This subclass is indented under subclass 58.68. Subject matter wherein the level of heat of the surrounding air is sensed by an element comprised of at least two metals having dissimilar coefficients of thermal expansion, the element moving in response to a change in the level of heat to effect control of the level of clutching medium in the working chamber (e.g., by operating a valve).

58.682 Spiral:

This subclass is indented under subclass 58.681. Subject matter wherein the element is coiled in plural convolutions which lie substantially in the same plane.

58.683 Resilient or adjustable mounting feature:

This subclass is indented under subclass 58.682. Subject matter wherein at least one end of the element is attached to a support on the clutch by recoilably yieldable means or by means permitting a change in the position of attachment.

58.684 Mounting feature:

This subclass is indented under subclass 58.681. Subject matter wherein the specifics of the attachment of the element to the clutch are cited as significant.

58.7 Pump-out feature:

This subclass is indented under subclass 58.5. Subject matter wherein a device is provided to force fluid from the working chamber to the storage chamber and wherein the shape, arrangement or material of said device is cited as significant.

58.8 Specific valve:

This subclass is indented under subclass 58.5. Subject matter wherein a device is provided for opening and closing a fluid passage extending between the storage and working chamber and wherein the shape, arrangement or material of said device is cited as significant.

58.9 Radial vane:

This subclass is indented under subclass 58.2. Subject matter, having a clutch member disposed radially inward of another clutch member, and one of the clutch members carries bladelikey elements which slidably engage the

other member, rotation being transmitted through circumferential compression of the fluid.

58.91 Vanes on inner member:

This subclass is indented under subclass 58.9. Subject matter wherein the bladelikey elements are carried by the radially inward member to slidably engage an inwardly facing surface on the other member.

58.92 Spring-biased:

This subclass is indented under subclass 58.91. Subject matter wherein recoilably yieldable means are provided to impart a radially outwardly directed force on the bladelikey elements.

59 Axially movable piston:

This subclass is indented under subclass 58.1. Clutches + in which the rotating driving member propels one or more pistons against the action of the clutching fluid in a direction parallel to the axis of rotation.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 290+ for similar structure used as a brake.

60 Transversely movable piston:

This subclass is indented under subclass 58.1. Clutches + in which the pistons move transversely to the axis of rotation, against the action of the clutching fluid.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 290+ for similar structure used as a brake.

61 Gear-pump type:

This subclass is indented under subclass 58.1. Clutches + in which the rotation is transmitted by means of the clutching fluid, which is forced between meshed gears.

(1) Note. Both this subclass, and Class 475, Planetary Gear Transmission Systems or Components, subclasses 91+, contain planetary units including gear pumps so arranged that when fluid flow through the pump is unrestricted, the unit slips, as the fluid flow is restricted, the unit planetates, and when fluid flow is completely shut off, the gear elements form-

ing the pump are locked against relative rotation and the unit is locked. Where a planet pinion of the unit drives a separate gear pump, the pump, in fact, operates as a planet pinion brake, and such art will be found in the appropriate one of the above listed subclasses in Class 475. Where a planet pinion and its intermeshing sun or orbit gear together constitute the gear pump, the device will be found in this subclass (192/61).

SEE OR SEARCH CLASS:

- 188, Brakes, subclass 292 for similar structure used as a brake.
 418, Rotary Expansible Chamber Devices, subclasses 54+ for rotary expansible chamber devices for working members having planetary or planetating movement; subclasses 166+ for rotary expansible chamber devices of the moving cylinder type having intermeshing peripheral surfaces and subclasses 191+ for rotary expansible devices having interengaging rotary members.
 475, Planetary Gear Transmission Systems or Components, subclasses 91+, and see (1) Note above.

- 62 Plow-lifting type:**
 This subclass is indented under subclass 30. Clutches adapted for use in raising plows.

SEE OR SEARCH CLASS:

- 172, Earth Working, subclasses 403+ and 407+ especially subclasses 410+ for earth working apparatus comprising a clutch associated with a wheel for lifting a plow.

- 63 Free-engine type:**
 This subclass is indented under subclass 30. Clutches for engine-drives designed to permit at times the engine to run free without transmitting power.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 42, for automatic type of free-engine clutch.

- 64 Velocipede free wheel:**
 This subclass is indented under subclass 30. Clutches designed to permit a velocipede wheel to run freely when the pedals are held.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 41+, for one-way clutches.

- 65 Axially and transversely engaging:**
 This subclass is indented under subclass 30. Clutches in which the engaging elements of the clutches have both a motion parallel and a motion transverse to the axis of rotation.

- 66.1 Axially engaging:**
 This subclass is indented under subclass 30. Subject matter wherein at least one engaging member is movable parallel to the axis of rotation to engage or disengage at least one other member.

- 66.2 Conical or frustoconical:**
 This subclass is indented under subclass 66.1. Subject matter wherein engaging faces of the members are in the form of a cone or frustocone.

- 66.21 Plural radially spaced surfaces:**
 This subclass is indented under subclass 66.2. Subject matter, with two or more concentric conical or frustoconical surfaces on each engaging member.

- 66.22 Spring engaged:**
 This subclass is indented under subclass 66.2. Subject matter wherein the faces are moved to a torque transmitting position by the action of a recoilably yieldable member.

- 66.23 Spring released:**
 This subclass is indented under subclass 66.2. Subject matter wherein the faces are moved to the disengaged position by the action of a recoilably yieldable member.

- 66.3 Planar radially extending:**
 This subclass is indented under subclass 66.1. Subject matter wherein engaging faces of the members are disposed in a plane perpendicular to the rotation axis.

- 66.31 Spring engaged:**
This subclass is indented under subclass 66.3. Subject matter wherein the faces are moved to a torque transmitting position by the action of a recoilably yieldable member.
- 66.32 Spring released:**
This subclass is indented under subclass 66.3. Subject matter wherein the faces are moved to the disengaged position by the action of a recoilably yieldable member.
- 69 Positive:**
This subclass is indented under subclass 66.1. Clutches in which the axially movable members carry elements that intermesh to transmit torque without slip.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
108, for improvements in the engaging faces, per se, of interlocking or positively engaged clutches.
- 69.1 Pivoting positive clutch element:**
This subclass is indented under subclass 69. Subject matter wherein at least one of the members includes an element which is swingably mounted to a point of attachment thereto and is engageable with another of the clutch members.
- 69.2 Plunger disconnect:**
This subclass is indented under subclass 69. Subject matter wherein a finger moving generally transversely to the axis of rotation of the clutch engages cooperating structure (e.g., a screw) which causes the engaging members to move to the disengaged position.
- 69.3 Pilot pawl:**
This subclass is indented under subclass 69. Subject matter wherein a member is provided with a swinging finger which engages ratchet teeth and is effective to cause synchronous engagement of the intermeshed elements.
- 69.4 Wheel hub clutched to axle:**
This subclass is indented under subclass 69. Subject matter wherein the positive clutch engages a wheel hub to an axle (e.g., in a four-wheel drive vehicle).
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
54.2, for hub clutches which engage in response to torque on the axle.
- SEE OR SEARCH CLASS:
180, Motor Vehicles, subclass 247 for a manual means to disengage drive to one or more, but fewer than all four of the wheels.
403, Joints and Connections, subclass 1 for selectively engageable hub to shaft connections.
- 69.41 Fluid pressure:**
This subclass is indented under subclass 69.4. Subject matter wherein one of the members of the positive clutch is shifted either into or out of engagement with another member by hydraulic or pneumatic pressure.
- 69.42 Electromagnetic:**
This subclass is indented under subclass 69.4. Subject matter wherein one of the members of the positive clutch is shifted axially either into or out of engagement with another member by the action of a solenoid or electric motor.
- 69.43 Manual:**
This subclass is indented under subclass 69.4. Subject matter wherein one of the members of the positive clutch is shifted axially into or out of engagement with another member by an operator manipulated knob or handle disposed on the hub or axle.
- 69.5 Ball or roller:**
This subclass is indented under subclass 69. Subject matter wherein at least one of the intermeshed elements is generally spherical or cylindrical and rotatably mounted relative to its corresponding member.
- 69.6 Cylindrical pin:**
This subclass is indented under subclass 69. Subject matter wherein at least one of the intermeshed elements is an elongated element of generally circular cross-section that is fixedly mounted to its corresponding member.

69.61 Axial pin on only one member:

This subclass is indented under subclass 69.6. Subject matter wherein only one member carries an elongated element which extends generally parallel to the rotation axis.

69.62 Pin engages aperture in other member:

This subclass is indented under subclass 69.61. Subject matter wherein the other of the engaging elements includes apertures to receive the elongated element.

- (1) Note. Here aperture is defined as a hole, slot, or recess defined by a periphery that surrounds the pin.

69.63 Radial pin:

This subclass is indented under subclass 69.6. Subject matter wherein the elongated element extends generally transverse to the clutch rotation axis.

69.7 Axial-radial:

This subclass is indented under subclass 69. Subject matter wherein one of the members includes elements extending axially from the member and joined thereto only on a radially extending surface of the member, and the other engaging member has radially extending elements adapted to interlock with the axially extending elements, the radially extending elements being joined to its associated member at least on one circumferential surface of the member.

69.71 Axially extending projection engages aperture:

This subclass is indented under subclass 69.7. Subject matter wherein the axially extending projection engages an aperture in the other member.

- (1) Note. Here aperture is defined as a hole, slot, or recess defined by a periphery that surrounds the axially extending projection.

SEE OR SEARCH THIS CLASS, SUBCLASS:

69.62, for projections that are cylindrical pins.

69.8 Axial-axial:

This subclass is indented under subclass 69. Subject matter wherein a pair of members each include elements extending axially from the members and joined thereto solely on a radially extending surface of the members.

- (1) Note. The elements must have a component in the axial direction.

69.81 Sawtooth:

This subclass is indented under subclass 69.8. Subject matter wherein the axially extending elements on at least one of the coupled members has the form of a tooth having one engaging surface that lies in a plane substantially parallel to or including the rotational axis and an adjacent engaging surface that lies in a plane oblique to the rotational axis.

69.82 Square tooth:

This subclass is indented under subclass 69.8. Subject matter wherein oppositely facing engaging surfaces on the elements of both members are each perpendicular to an end face of the element.

69.83 With lead-in:

This subclass is indented under subclass 69.82. Subject matter wherein at least one of the elements includes a configuration to facilitate engagement.

69.9 Radial-radial:

This subclass is indented under subclass 69. Subject matter wherein the members each include at least one element which extends radially and are joined to their respective member at least on one circumferential surface of the respective member.

69.91 Outward projection on movable member:

This subclass is indented under subclass 69.9. Subject matter wherein only one of the members moves parallel to the axis of rotation and has at least one element which extends radially from an outer circumferential surface of said one member.

70 Spreading:

This subclass is indented under subclass 66.1. Clutches in which two axially moving members are spread to engage the companion members of the clutch.

70.11 Interposed, mating clutch-elements:

This subclass is indented under subclass 66.1. Device having an input (i.e., driving) shaft and an output (i.e., driven) shaft rotatable about a common axis and at least three members supported thereby in an array of adjacent members spaced along the axis and co-axial with the shafts, the outer of said members having surfaces facing opposite surfaces of one or more intermediate members; one of said members being constrained to rotate with one of the shafts, another of said members being constrained to rotate with the other of the shafts but being movable along the common axis, and a third of said members being movable along the common axis; the device also having means for moving said members toward one another for mutual engagement of the facing surfaces, whereby the input shaft transmits its rotation to the output shaft when the facing surfaces are mutually engaged.

- (1) Note. In this and indented subclasses one clutch-element is connected to one of the shafts and is sandwiched between two other clutch-elements that are connected to the other shaft. In a variation of this arrangement a multiplicity (usually more than three) of clutch-elements is connected for rotation with one shaft and a multiplicity of clutch-elements is connected for rotation with the other shaft, the elements of one shaft alternating with the elements of the other shaft. The variation described is called a "multiple-element clutch-assembly" in the definitions and notes of the subclasses indented hereunder.
- (2) Note. The clutch-assembly is usually enclosed by a "flywheel" and a "cover plate". A flywheel is a heavy component secured to the input shaft to stabilize rotational momentum thereof, and a cover plate (also known as a "back plate") also encloses a "pressure plate" (which is a component that, compared to

a clutch-element, is relatively thick and heavy) and an actuator that urges the pressure plate towards clutch-elements lying between the pressure plate and the flywheel to effect engagement of the clutch-assembly.

- (3) Note. The term "shaft", as used in the definition above, is intended as the generic name of a torque-transmitting member which is referred to by a variety of names, including: shaft, flywheel (usually applied to the input of an automobile), pulley, gear, drum, hub, spindle, axle, sleeve, etc., the named terms being only exemplary of those used.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.09+, and 85.24+, for a clutch having more than two mating friction elements.

SEE OR SEARCH CLASS:

188, Brakes, subclass 71.5 for disclosure of rotationally-fixed elements interleaved between rotatable elements and axially moved to retard rotation of the rotatable elements.

70.12 With means to cool or lubricate clutch parts:

This subclass is indented under subclass 70.11. Device provided with means for reducing the temperature of, or for supplying a friction-reducing fluid to, any of the members or components of a clutch-assembly.

- (1) Note. The term "clutch-assembly" is defined in (1) Note to the definition of subclass 48.1 above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

113+, for clutch lubricating and/or cooling means, e.g., per se.

70.13 With removable or replaceable or interchangeable clutch parts:

This subclass is indented under subclass 70.11. Device wherein any of the members or sub-assemblies of the device may be taken out of the clutch-assembly, or put back into the clutch-assembly, or wherein one such mem-

ber or sub-assembly may be exchanged for another such member or sub-assembly.

- (1) Note. The term “clutch-assembly” is defined in (1) Note to the definition of subclass 48.1 above.
- (2) Note. It is inherent in any device that is assembled from a plurality of parts that the device may be disassembled and then re-assembled with the same or equivalent parts. Therefore, an original patent placed in this subclass should clearly disclose the features implicit in the title and definition of the subclass.

70.14 Including surface characteristics of clutch-element:

This subclass is indented under subclass 70.11. Device having a distinctive, structurally-significant peculiarity in the engaging face of the member.

- (1) Note. Terms such as “segmented”, or “faced with leather”, or “roughened” or “tapered” are considered to be structurally-significant descriptors of the engaging surface. Functional terms such as “friction surface” are not proper for this subclass (70.14), and clutch-elements so described will be found elsewhere according to their other characteristics.
- (2) Note. Compare this subclass (70.14) with subclass 107 of this class (192). A device in this subclass (70.14) relates to a clutch-element clearly identifiable as part of an opposed-element clutch-assembly, whereas a device of subclass 107 relates to the engaging face of an element, per se, usable in a clutch or brake.

SEE OR SEARCH THIS CLASS, SUBCLASS:

107+, for engaging elements, and see (2) Note above.

SEE OR SEARCH CLASS:

188, Brakes, subclass 73.1 for disclosure of surface characteristics enhancing friction of a braking element, and subclass 73.2, for disclosure of a conical braking element.

70.15 Axially tapered mating surfaces:

This subclass is indented under subclass 70.14. Device wherein the engaging face of the member is distinctive by being, at least in part, a frustoconical surface, and wherein the engaging face of a member having mutual engagement with the first-mentioned member is also a frustoconical surface that complements the first-mentioned surface.

- (1) Note. A device having clutch-elements whose adjacent complementary engaging surfaces show a profile, on a cross-section passing through the axis of rotation of the clutch-elements, of V-shaped or zigzag configuration, is proper for this subclass (70.15).

70.16 With torque connection between clutch-element and its shaft:

This subclass is indented under subclass 70.11. Device provided with means which (a) transmits rotational force from an input shaft to a member supported thereby, or transmits rotational force from another member to an output shaft that supports the other member, and (b) simultaneously permits movement of either member relative to its supporting shaft.

- (1) Note. It is emphasized that this and indented subclasses provide for the connection between a shaft and the clutch-element supported thereby, rather than for the means transmitting rotation from one clutch-element to a mating clutch-element. The permitted movement may be rotational as in subclass 70.17 below, or axially slidable as in subclass 70.19 below, or oscillating about an axis perpendicular to the axis of rotation of the shafts as in this subclass (70.16).

70.17 Resilient torque connection (e.g., for damping vibration):

This subclass is indented under subclass 70.16. Device wherein said means is recoilably yieldable to a limited extent in the rotation direction, whereby the permitted movement is a limited degree of variation between the rotation of a shaft and the rotation of the member supported thereby.

- (1) Note. It is emphasized that the amount of variation of transmitted rotation is extremely small, and that the primary purpose of the resilient connection is to absorb shock inherent in the act of causing a stationary clutch-element to be engaged suddenly by a rotating clutch-element. The resilient connection permits the torque to be applied from the shaft to the clutch-element supported thereby (or from the clutch-element to its supporting shaft) without stressing any of the parts to an excessive degree. The "permitted movement" of the clutch-element is rotation momentarily addition to and/or subtractive from the rotation of its supporting shaft. However, the rotation of the clutch-element quickly matches that of its supporting shaft.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

200+, for a subcombination comprising a clutch-element (or similar structure such as a brake element) resiliently mounted on a hub.

70.18 Including chordally disposed connection:

This subclass is indented under subclass 70.17. Device wherein said means comprises a link or strap having two ends, one end of which is attached to a clutch-element (or to an equivalent rotating member such as a pressure plate or flywheel) at a point on the clutch-element radially spaced from the axis of rotation thereof, and the other end of which link is attached to a driving or driven shaft (or to an equivalent rotating member integral therewith) at a point on the shaft radially spaced from the axis of rotation thereof and angularly spaced from the first-mentioned attachment.

- (1) Note. The attachment at either end of the link may take the form of a pivot pin passing through a hole in the link or a resilient connection between the link and the clutch-element or its supporting shaft. The necessary requirement for this subclass (70.18) is not the form of attachment, but rather that the link extend between the two rotating parts (i.e., the clutch-element and its supporting shaft) as if the link were a chordal

link intersecting circles of revolution traced by link-connecting parts of the clutch-element and its shaft.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

212+, for a subcombination of a clutch-element connected to a hub by a helical-coil spring wherein the spring is chordally disposed between the clutch-element and the hub.

70.19 Axially slidable connection:

This subclass is indented under subclass 70.16. Device wherein the means comprises portions integral with or secured to either shaft extending along or parallel to the axis of rotation thereof which portions connect the member to its supporting shaft for rotation and permit movement only in a direction parallel to said axis.

70.2 Spline connection for multiple clutch-elements:

This subclass is indented under subclass 70.19. Device wherein the portions comprise gear-like teeth and grooves in the shaft (or drum) mating with complementary grooves and teeth in the member, (or comprise ribs and slots in the shaft (or drum) mating with complementary slots and protrusions in the member), and wherein a plurality of first members are in torque-transmitting connection with an input shaft, a plurality of second members are in torque-transmitting connection with an output shaft coaxial with the input shaft, and the first and second members alternate with one another along the axis of the shafts.

70.21 With means to move multiple clutch-elements axially and sequentially:

This subclass is indented under subclass 70.11. Device including a multiple-element clutch-assembly the members of which are arranged along an axis of rotation, and provided with means for moving the members along said axis, wherein said means causes said members to engage one another in a predetermined succession of mutual engagements along said axis, or to disengage from one another in the same or an opposite succession of mutual disengagements.

- (1) Note. The purpose of the structure described is to ensure that torque from one shaft is applied gradually to the other shaft rather than suddenly.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48.7, and 52.1+, for other arrangements for progressively transmitting load from an input to an output shaft.

70.22 With means to move clutch-element axially and latch into engaged or disengaged position:

This subclass is indented under subclass 70.11. Device provided with means for moving a member along said axis and with means additional to the member-moving means, which additional means maintains the members in close contact with one another, or maintains the members apart from one another, until the members are released to permit movement thereof by member-moving means.

- (1) Note. Some devices of subclasses 70.29 and 70.3 below include a toggle linkage to move a pressure plate or the clutch-elements axially. A toggle linkage comprises two pivotable links joined together by an intermediate pivot, and such linkage is inherently capable of latching itself if the intermediate pivot is moved "overcenter", i.e., past an imaginary line connecting the end pivots. Such structure will be proper for this subclass (70.22) only when the toggle linkage locks itself, i.e., is moved "overcenter".

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70.29, and 70.3, for a toggle-link actuator and see (1) Note above.

114+, for element-locking means, e.g., per se.

70.23 With cam or wedge contacting clutch-element or pressure plate for axial movement thereof:

This subclass is indented under subclass 70.11. Device provided with means for moving a member along said axis wherein the member-moving means includes a movable component having a surface in sliding engagement with a

surface portion of a member or of a pressure plate, the component surface and the member or plate surface being so related and contoured that movement of the component in a predetermined direction is converted into axial movement of the member or pressure plate.

- (1) Note. A device is proper for this subclass (70.23) even if sliding friction between the cam surfaces is reduced by use of a roller at the area of contact between the cam and the clutch-element or pressure plate.
- (2) Note. The movement of the component is usually oscillation in the case of a cam, and reciprocation (often in a radial direction) in the case of a wedge.
- (3) Note. A device is proper for this subclass (70.23) if its cam or wedge contacts a cam surface on a flywheel that has an engaging surface equivalent to a clutch-element surface.

70.24 By cam surface on bell-crank:

This subclass is indented under subclass 70.23. Device wherein the component comprises a lever pivoted between its ends for oscillation in a plane parallel to the axis of rotation of the clutch-assembly, and the lever having the sliding surface at one of its ends, whereby oscillation of the component within the plane is converted into axial movement of the member of the pressure plate.

70.251 With adjustable means to move clutch-element axially (e.g., to compensate for wear):

This subclass is indented under subclass 70.11. Device provided with member-moving means for moving a first one of the members along said axis and with means ("additional means") additional to the member-moving means, which additional means is capable of axially changing the positional relationship between the first member and another of the members mating therewith, such change being additional to the movement effected by the member-moving means.

- (1) Note. The structure described is for the purpose of offsetting the decrease in the axial dimension of the clutch-elements due to attrition of the surfaces of the ele-

ments that occurs as they are repeatedly engaged and disengaged under load.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

85.62, for a fluid-operated clutch including a wear compensator that operates by fluid actuator adjustment or control rather than by adjustment of relative positions of friction elements.

111.1+, for wear-compensators, per se.

70.252 Automatic:

This subclass is indented under subclass 70.251. Device in which the additional means operates to change the positional relationship between the members without human assistance or intervention beyond that which occurs during normal use of the device.

70.26 Including plural adjusting screws (e.g., to equalize pressure angularly):

This subclass is indented under subclass 70.251. Device provided with two or more of said additional means, each of which additional means comprises a bolt or threaded male member rotatable relative to a nut or threaded female member.

- (1) Note. Each of the plurality of screws or bolts is disposed radially outwardly of the axis of rotation of the shafts, and each is angularly spaced from the others (usually equally spaced) so that the amount of adjustment of each of the screws may be chosen to compensate for that degree of wear required by the portion of the clutch-element surface adjacent to that screw.

70.27 With spring means to move clutch-element axially:

This subclass is indented under subclass 70.11. Device provided with means for moving a member along said axis, wherein the member-moving means includes at least one elastic body that tends to recover its shape when distorted.

- (1) Note. A “Belleville” spring (i.e., a relatively thin, resilient disc that is dished or tapered in shape) is found herein, as well as a common coil spring. Usually the spring acts along a line parallel to or

coinciding with the axis of rotation of the shaft.

70.28 To separate engaged clutch-elements:

This subclass is indented under subclass 70.27. Device wherein the elastic bodies tend to move the members apart from one another.

- (1) Note. Examples of devices in this subclass (70.28) include: a device wherein a spring is used alternatively to engage or to disengage the clutch-elements, and a device wherein a spring is stressed (as by actuating a lever) only when the clutch-elements are to be disengaged. The necessary requirement is not the means for urging the clutch-elements into engagement (such means will be found elsewhere in this class (192) but rather than a spring is used to disengage the clutch-elements.

70.29 And actuator lever pivoted on pressure plate:

This subclass is indented under subclass 70.27. Device wherein the member-moving means also includes a bar oscillatable about a fulcrum by application of force thereto, which fulcrum is connected to or mounted on a pressure plate, said fulcrum being a pivot pin or the equivalent of a “knife edge” about which the bar oscillates.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70.22, for a “toggle linkage” pivoted on a pressure plate, and see (1) Note to the definition of subclass 70.22 for a relationship between the subclasses.

70.3, for an actuator lever pivoted on a back plate, or on both a back plate and a pressure plate.

70.3 With actuator lever pivoted on pressure plate or back plate to move clutch-element axially:

This subclass is indented under subclass 70.11. Device provided with means for moving a member along said axis, wherein the member-moving means includes a bar oscillatable about a fulcrum by application of force thereto, which fulcrum is connected to or mounted on a pressure plate or a cover plate, said fulcrum

- being a pivot pin or the equivalent of a “knife edge” about which the bar oscillates.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 70.22, for a “toggle linkage” pivoted on a pressure plate and a cover plate, and see (1) Note to the definition of subclass 70.22 for a relationship between the subclasses.
- 70.29, for an actuator lever pivoted on a pressure plate and opposed or aided by a spring means.
- Transversely engaged:**
This subclass is indented under subclass 30. Clutches in which the movable engaging element has movement transverse to the axis of rotation.
- 71 Positive:**
This subclass is indented under the unnumbered subclass, Transversely engaged. Clutches under Transversely engaged in which the clutch elements engage positively.
- 72 Interior and exterior:**
This subclass is indented under the unnumbered subclass, Transversely engaged. Clutches under Transversely engaged in which the transversely-moving member or members engage other members both exteriorly and interiorly.
- 73 Opposing:**
This subclass is indented under subclass 72. Clutches in which the member or members moving transversely grip an intermediate member.
- 74 Interior:**
This subclass is indented under the unnumbered subclass, Transversely engaged. Clutches under Transversely engaged in which the member moving transversely, becomes engaged with the interior of a rotatable member.
- 75 Expanding:**
This subclass is indented under subclass 74. Clutches in which two or more members, moving transversely away from the axis of rotation, engage the interior of the rim or rotatable member.
- 76 Radial:**
This subclass is indented under subclass 75. Clutches in which the motion of the transversely-engaging members is radial.
- 77 Split ring:**
This subclass is indented under subclass 75. Clutches in which the transversely-moving member is a split ring.
- (1) Note. The split ring is usually released from engagement by its own resilience.
- 78 Cam operated:**
This subclass is indented under subclass 77. Clutches in which the split ring is spread by means of a cam.
- 79 Exterior:**
This subclass is indented under the unnumbered subclass, Transversely engaged. Clutches under Transversely engaged, in which the transversely moving members engage the exterior of the rotating part.
- 80 Strap:**
This subclass is indented under subclass 79. Clutches in which the exterior transversely-moving member is a flexible strap or band.
- 81 Multiple folds:**
This subclass is indented under subclass 80. Clutches in which the strap encircles the drum or wheel in two or more folds.
- 82 Operators:**
This subclass is indented under subclass 30. Subject matter including an actuating device that causes the power-transmitting device to transition into or out of a state in which it provides the driving continuity between the driving and driven parts.
- 83 Multiple for same clutch:**
This subclass is indented under subclass 82. Devices which include two or more devices for operating the same clutch.
- 84.1 Electric or magnetic:**
This subclass is indented under subclass 82. Subject matter, wherein frictional or interlocking engagement of driving and driven clutch

parts is effected by attraction between elements having opposite potential or polarity.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 3.56, 12, 17, or 18 for an electric or magnetic component involving a clutch and brake system.
- 21.5, for a field responsive system.
- 40, for an electric or magnetic component in a manually controlled clutch.
- 48.2, for an electrically actuated plural clutch assemblage.
- 53.2, for a positive frictional clutch operated by electric or magnetic means.
- 54.4, for a magnetic or electromagnetic torque responsive clutch.
- 56.4, + for an overload release having magnetic or electromagnetic means
- 69.42, for a wheel hub clutched to axle having electromagnetic means.
- 90, for an operator that is spring engaged having electric release.

SEE OR SEARCH CLASS:

- 188, Brakes, subclasses 158+ for an electric operator for a frictional damping system.
- 310, Electrical Generator or Motor Structure, subclasses 92+ for an electrically operated clutch in a motor or generator.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 220+ for electromagnetic operators, per se.
- 464, Rotary Shafts, Gudgeons, Housings, and Flexible Couplings for Rotary Shafts, subclass 29 for an electrical or magnetic coupling.

84.2 Plural coils:

This subclass is indented under subclass 84.1. Subject matter, wherein clutch engagement is effected by the attraction between poles of opposite magnetic polarity and these poles are the result of a magnetic field produced by the flow of electric current in two or more distinct windings of conductors.

84.21 Plural armatures:

This subclass is indented under subclass 84.2. Subject matter, wherein two or more windings effect movement of two or more independently movable, magnetizable members.

84.3 Including permanent magnet:

This subclass is indented under subclass 84.1. Subject matter, wherein a material which naturally attracts iron provides opposite polarities that affect engagement of the driving and driven clutch parts.

84.31 And electromagnet:

This subclass is indented under subclass 84.3. Subject matter, wherein a field produced by the flow of electric current in a coiled conductor also affects engagement of the clutch parts.

84.4 Electrostatic:

This subclass is indented under subclass 84.1. Subject matter, wherein engagement of driving and driven clutch parts is effected by the electro-adhesive forces between a conductive member and a semi-conductive member subjected to an electric-potential difference.

84.5 Air gap adjustment:

This subclass is indented under subclass 84.1. Subject matter, wherein structure is provided to set to a predetermined value a distance between elements of opposite magnetic polarities when the clutch parts are in a disengaged condition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 110, for adjusting devices, per se.
- 111.1+, for wear compensators, per se.

84.51 Automatic:

This subclass is indented under subclass 84.5. Subject matter, wherein the distance is set without manipulation by an operator.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 111.1+, for automatic wear compensators, per se.

84.6 Rotary electric motor is clutch actuator:

This subclass is indented under subclass 84.1. Subject matter, wherein the attraction between elements of opposite magnetic polarity pro-

duces a relative rotation between the elements which, through a motion converting mechanism, effects engagement of driving and driven clutch parts.

84.7 Mechanical force increasing means:

This subclass is indented under subclass 84.1. Subject matter, wherein structure is provided to amplify a clutch-engaging force after an initial clutch engagement is effected by the attraction between elements of opposite magnetic polarity.

84.8 Operator for transversely engaging elements:

This subclass is indented under subclass 84.1. Subject matter, wherein driving and driven parts rotate about an axis and are engageable by a motion in a direction perpendicular to said axis.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

71, and 81, for transversely engaging clutches, per se.

84.81 Coil spring:

This subclass is indented under subclass 84.8. Subject matter, wherein one of the driving and driven clutch parts is an elongated member wound into a helix shape that is adapted to unwind into or out of frictional engagement with the other clutch part.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

89.2+, for a spring-engaged operator.

84.9 Operator for axially engaging elements:

This subclass is indented under subclass 84.1. Subject matter, wherein the driving and driven clutch parts rotate about an axis and are engageable by a motion in a direction parallel to said axis.

84.91 Interposed friction elements:

This subclass is indented under subclass 84.9. Subject matter, wherein frictional engagement is provided by three or more friction elements with one or more of the friction elements being sandwiched between adjacent elements.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70.11+, appropriate subclasses for clutches, per se, having interposed friction elements.

84.92 Positively engaging elements:

This subclass is indented under subclass 84.9. Subject matter, wherein the driving and driven clutch parts carry formations which interlock to transmit torque without slip.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

69.42, for positively engaging clutches, per se.

84.93 Magnetic flux path spaced from engaging elements:

This subclass is indented under subclass 84.9. Subject matter, wherein the engagement is effected by a magnetic circuit which bypasses the engaging surfaces of the clutch parts.

84.94 Specified torque transmitting spring:

This subclass is indented under subclass 84.9. Subject matter, wherein one or more of the elements moving parallel to the axis is connected to one of the driving and driven clutch parts by one or more resilient members and wherein the shape, arrangement, or material of the one or more resilient members is cited as significant.

84.941 Nonmetallic:

This subclass is indented under subclass 84.94. Subject matter, wherein the one or more resilient members is formed of a material other than metal.

84.95 With slip rings:

This subclass is indented under subclass 84.9. Subject matter, wherein an electromagnet is carried by and rotates with one of the driving and driven parts and electric current is supplied to the electromagnet by a connection including brushes and rotary contacts.

84.951 With pulley or gear:

This subclass is indented under subclass 84.95. Subject matter, wherein torque is transmitted to or from one of the driving and driven clutch parts by means of a toothed member or a torque transmitting belt or chain.

84.96 Fixed concentric coil:

This subclass is indented under subclass 84.9. Subject matter, wherein a stationary, annular electromagnetic coil surrounds the clutch axis and magnetizes one of the driving and driven clutch parts to provide a pole piece which attracts the other of the driving and driven clutch parts into engagement therewith.

84.961 With pulley or gear:

This subclass is indented under subclass 84.96. Subject matter, wherein torque is transmitted to or from one of the driving and driven clutch parts by means of a toothed member or a torque transmitting belt or chain.

85.01 Fluid pressure:

This subclass is indented under subclass 82. Subject matter in which the actuating device is powered by the action of a fluid under pressure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

3.29+, and 3.33, for a fluid-pressure operator to engage or actuate a clutch that is combined with a vortex-flow drive.
48.601, for plural clutches at least one of which is fluid-pressure operated.
56.3, for an overload release mechanism in a fluid-pressure operated clutch.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, appropriate subclasses for an expansible chamber device, per se, even though disclosed as a means to operate a clutch.
303, Fluid-Pressure and Analogous Brake Systems, appropriate subclasses for systems of distribution of fluid to motors of more general application.

85.02 Operator force derived from clutch input or output:

This subclass is indented under subclass 85.01. Subject matter in which power is transmitted from one of the driving and driven parts via the fluid to the actuating device.

85.03 Elastic (e.g., diaphragm, pneumatic tube):

This subclass is indented under subclass 85.01. Subject matter in which the actuating device includes a flexible element that flexes in response to changes in fluid pressure.

(1) Note. Devices in which the actuating device includes sliding seals, in addition to a flexible element, along which sliding occurs during expansion or contraction are included in this subclass.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, subclasses 34+ for a bellows type expansible chamber device, and subclasses 90+ for a flexible wall type expansible chamber device.

85.04 Rotating with clutch input or output:

This subclass is indented under subclass 85.03. Subject matter in which the flexible element rotates integrally with one of the driving and driven parts.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

85.17+, for an elastic clutch-actuating member that rotates relative to the clutch input and output.

85.05 And causing purely axial movement:

This subclass is indented under subclass 85.04. Subject matter in which flexing of the flexible element causes a component of the power-transmitting device to move in a first direction along a path that is parallel to the axis of rotation of the driving or driven part.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

85.2+, 85.15, and 85.49+, for other actuator configurations for producing axial displacement of a clutch element.

85.06 Including flexible friction discs:

This subclass is indented under subclass 85.05. Subject matter in which the flexible element includes a pair of flexible discs on which friction surfaces for providing the driving continuity are located, the fluid acting directly on the discs to cause elastic deformation thereof and,

thereby, affect the extent of engagement of the friction surfaces with each other.

85.07 Plural oppositely acting elastic operators:
This subclass is indented under subclass 85.05. Subject matter in which the power-transmitting device includes an additional flexible element on which the fluid acts to cause it to flex and move in a second direction substantially opposite the first direction when the fluid acts on the flexible elements.

85.08 Clutch has flat friction surfaces:
This subclass is indented under subclass 85.05. Subject matter in which the component of the power-transmitting device is a first member having a first planar surface and the power-transmitting device includes a second member having a second planar surface parallel to the first planar surface, movement of the component in the first direction resulting in engagement of the first and second planar surfaces to transmit power therebetween by friction, the first and second members being drivingly connected, respectively, to the driving and driven parts.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.23+, for a clutch having flat friction surfaces that is operated by a fluid-pressure actuator other than an elastic actuator.

85.09 More than two friction elements:
This subclass is indented under subclass 85.08. Subject matter including a third member drivingly connected to one of the driving and driven parts and having a third planar surface parallel to the first planar surface, the second member having a fourth planar surface parallel to the first planar surface, the third member being movable axially relative to the second member such that the third and fourth planar surfaces engage to transmit power therebetween by friction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

70.11+, and 85.24+, for a clutch having three or more friction elements.

85.1 Plate or diaphragm spring release:
This subclass is indented under subclass 85.09. Subject matter in which the first, second, third, and fourth planar surfaces are separated by the force of a substantially planar spring with or without radial slits that form a plurality of fingers.

85.11 Clutch has positively engaging clutch members:
This subclass is indented under subclass 85.05. Subject matter in which the power-transmitting device includes separable interlocking power-transmitting elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.18, for a clutch having positively engaging clutch members operated by a fluid actuator other than an elastic actuator.

85.12 And causing purely radial movement:
This subclass is indented under subclass 85.04. Subject matter in which flexing of the flexible element causes a first component of the power-transmitting device to move substantially along a line perpendicular to the axis of rotation of the driving or driven part when the fluid acts on the flexible element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

48.615, 85.16, and 85.47, for a clutch operated by a radially acting fluid pressure actuator.

85.13 Elastic operator integral with radially outer clutch member:
This subclass is indented under subclass 85.12. Subject matter in which the first component engages a second component of the power-transmitting device in order to establish the driving continuity between the driving and driven parts, the first and second components being radially spaced and the flexible element having a portion that is fixed to the radially outer one of the first and second components.

85.14 Rotatable relative to clutch input and output:

This subclass is indented under subclass 85.03. Subject matter in which the flexible element is rotatable relative to both the driving and driven parts.

85.15 And causing purely axial movement:

This subclass is indented under subclass 85.14. Subject matter in which flexing of the flexible element causes a component of the power-transmitting device to move along a path that is parallel to the axis of rotation of the driving part or driven part.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.05+, 85.2+, and 85.49+, for other actuator configurations for producing axial displacement of a clutch element.

85.16 And causing purely radial movement:

This subclass is indented under subclass 85.14. Subject matter in which flexing of the flexible element causes a component of the power-transmitting device to move substantially along a line perpendicular to the axis of rotation of the driving or driven part.

SEE OR SEARCH THIS CLASS, SUBCLASS:

48.615, 85.12+, and 85.47, for a clutch operated by a radially acting fluid pressure actuator.

85.17 Piston and cylinder operator rotating with clutch input or output:

This subclass is indented under subclass 85.01. Subject matter in which the actuating device includes an enclosure (cylinder) in which a partition (piston) is slidably received in sealing engagement with the enclosure, fluid being admitted into the enclosure to apply a force to the enclosure and the partition, the enclosure or the partition being connected to and rotating integrally with the driving or driven part, relative displacement of the enclosure and partition due to the force applied by the fluid contributing to the transition of the power-transmitting device into or out of the state in which it provides the driving continuity between the driving and driven parts.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.04+, for an elastic clutch actuating member that rotates integrally with the clutch input or output.

85.18 Positive clutch:

This subclass is indented under subclass 85.17. Subject matter in which the power-transmitting device includes separable interlocking power-transmitting elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.11, for a clutch having positively engaging clutch members operated by an elastic fluid actuator.

85.19 Friction clutch:

This subclass is indented under subclass 85.17. Subject matter in which the power-transmitting device includes power-transmitting elements having mutually engageable surfaces that transmit power from one to another substantially solely by friction forces when pressed together.

85.2 Having friction elements movable axially only:

This subclass is indented under subclass 85.19. Subject matter in which the power-transmitting elements are engageable and disengageable by relative movement along a path that is parallel to an axis of rotation of at least one of the power-transmitting elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.05+, 85.15, and 85.49+, for other actuator configurations for producing axial displacement of a clutch element.

85.21 Having conical or frustoconical friction surfaces (e.g., cone clutch):

This subclass is indented under subclass 85.2. Subject matter in which the mutually engageable surfaces of the power-transmitting elements have the shape of a cone or frustum of a cone.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

66.2, for axially engaging clutches having conical or frustoconical friction surfaces.

85.22 Plural radially spaced frustoconical surfaces:

This subclass is indented under subclass 85.21. Subject matter in which the mutually engageable surfaces of the power-transmitting elements include a plurality of radially spaced concentric frustoconical surfaces on each power-transmitting element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

66.21, for axially engaging clutches having plural radially spaced frustoconical friction surfaces.

85.23 Having flat friction surfaces:

This subclass is indented under subclass 85.2. Subject matter in which the mutually engageable surfaces of the power-transmitting elements are substantially planar.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

85.08+, for a clutch having flat friction surfaces that is operated by an elastic fluid-pressure actuator.

85.24 More than two friction elements:

This subclass is indented under subclass 85.23. Subject matter in which the power-transmitting device has at least three of the power-transmitting elements.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70.11+, and 85.09+, for a clutch having three or more friction elements.

85.25 Including balance chamber:

This subclass is indented under subclass 85.24. Subject matter including a fluid receiving space outside the enclosure that rotates with the actuating device and is arranged such that rotation induced fluid pressure in the space acts on the partition or the enclosure to counteract an effect of a similar rotation induced pressure in the fluid in the enclosure.

- (1) Note. The purpose of the balance chamber is, typically, to prevent a rotating clutch from being locked in an engaged (power-transmitting) state due to centrifugal forces acting on the fluid used to initially engage the clutch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

106, for a speed responsive clutch that may be fluid operated and include means to prevent locking of the clutch due to centrifugal forces acting on the operating fluid.

85.26 placeCam mechanism between piston and friction element:

This subclass is indented under subclass 85.24. Subject matter in which motion is transmitted from the enclosure or partition to at least one of the power-transmitting elements by a mechanism including slidably engaged relatively moving surfaces that include portions inclined to the direction of relative motion at a point of contact between the surfaces.

85.27 Auxiliary exhaust or relief passage from piston chamber:

This subclass is indented under subclass 85.24. Subject matter in which there are one or more primary inlets and outlets for the fluid in the enclosure or partition which inlets and outlets supply and return substantially the bulk of the fluid to the enclosure and the enclosure or partition includes an additional passage that permits flow of fluid out of the enclosure to provide an additional level of control over the action of the fluid on the device.

- (1) Note. A plurality of return passages extending from and leading along similar paths to a fluid receiver or common exhaust channel is not sufficient to warrant placement here. This subclass requires a passage associated with a substantially different fluid exhaust path.

85.28 Fluid escape from piston chamber by rotation-induced pressure:

This subclass is indented under subclass 85.27. Subject matter in which substantially all of the flow of fluid from the enclosure through the additional passage is the result of pressuriza-

tion of the fluid relative to pressure outside of the enclosure due to rotation of the enclosure.

85.29 In piston:

This subclass is indented under subclass 85.27. Subject matter in which the additional passage is formed in the partition.

85.3 Valve in passage:

This subclass is indented under subclass 85.29. Subject matter including structure that moves between a state in which it interrupts or blocks flow through the additional passage and a state in which it permits the flow during operation of the power-transmitting device.

85.31 Valve in passage:

This subclass is indented under subclass 85.27. Subject matter including structure that moves between a state in which it interrupts or blocks flow through the additional passage and a state in which it permits the flow during operation of the power-transmitting device.

85.32 Variable fluid contacting piston area:

This subclass is indented under subclass 85.24. Subject matter in which the fluid is brought into contact with different portions of the partition at different times during a single stroke of the partition.

(1) Note. Typically, the total area of contact between the fluid and the partition (piston) is increased in stages resulting in a more gradual increase in the force acting on the power-transmitting elements than would occur if the fluid were introduced into contact with the entire area at once.

85.33 Axially stationary piston, moving cylinder:

This subclass is indented under subclass 85.24. Subject matter in which the partition is fixed relative to the driving or driven part during operation of the power-transmitting device.

85.34 Cushioning element between piston and friction element:

This subclass is indented under subclass 85.24. Subject matter including a resilient element that deforms significantly in operation located in a force transmission path between the partition and one of the power-transmitting elements.

(1) Note. Typically, the resilient element provides for a more gradual increase in the force acting on the power-transmitting elements than would occur without the resilient element.

85.35 Operator acts on friction elements via diaphragm spring or lever:

This subclass is indented under subclass 85.24. Subject matter in which at least part of the force applied to the partition by the fluid is transmitted to the power-transmitting elements through a radially extending finger of an annular spring or a lever pivotally mounted in the power-transmitting device.

85.36 Electric or magnetic release:

This subclass is indented under subclass 85.24. Subject matter including a device utilizing electrical or magnetic forces that is at least partially responsible for causing the power-transmitting device to transition out of the state in which it provides the driving continuity between the driving and driven parts.

SEE OR SEARCH THIS CLASS, SUBCLASS:

84.1+, for an electric or magnetic operator that applies a clutch.

85.37 Fluid released clutch:

This subclass is indented under subclass 85.24. Subject matter in which the fluid under pressure is used to cause the power-transmitting device to transition out of the state in which it provides the driving continuity between the driving and driven parts.

85.38 And fluid pressure engaged:

This subclass is indented under subclass 85.37. Subject matter in which the force applied by the fluid to the enclosure and the partition contributes to the transition of the power-transmitting device into the state that provides the driving continuity between the driving and driven parts.

85.39 Spring released clutch:

This subclass is indented under subclass 85.24. Subject matter including an elastic element that deforms significantly in operation that is at least in part responsible for the transition of the power-transmitting device out of the state in

- which it provides the driving continuity between the driving and driven parts.
- 85.4 Release spring between discs:**
This subclass is indented under subclass 85.39. Subject matter in which the elastic element is located between and presses in separating directions against two of the power-transmitting elements.
- 85.41 Coil spring:**
This subclass is indented under subclass 85.39. Subject matter in which the elastic element has a helical shape and is deflected along its axis during use.
- 85.42 Encircling clutch axis of rotation:**
This subclass is indented under subclass 85.41. Subject matter in which the axis of rotation of the power-transmitting elements passes through the interior of the elastic element.
- 85.43 Having particular friction element structure:**
This subclass is indented under subclass 85.24. Subject matter including details of the power-transmitting elements.
- 85.44 Having particular piston seal:**
This subclass is indented under subclass 85.24. Subject matter including details of means for preventing leakage of fluid between the partition and enclosure.
- 85.45 Piston has interrupted engagement face:**
This subclass is indented under subclass 85.24. Subject matter in which the surface of the partition opposite its surface facing the interior of the enclosure has first and second portions and has a third portion located between the first and second portions, the first and second portions contacting one of the power-transmitting elements to apply an actuating force to the power-transmitting element while the third portion is spaced from the power-transmitting element.
- 85.46 Piston has nonplanar engagement face:**
This subclass is indented under subclass 85.24. Subject matter in which there is at least one area of contact between the partition and one of the power-transmitting elements that is non-planar.
- 85.47 Having radially displaceable friction surface:**
This subclass is indented under subclass 85.19. Subject matter in which some of the mutually engageable surfaces of the power-transmitting elements change their distance from the axis of rotation of at least one of the power transmitting elements as the mutually engageable surfaces are pressed together.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
48.615, 85.12+, and 85.16, for a clutch operated by a radially acting fluid pressure actuator.
- 85.48 Operator rotatable relative to clutch input and output:**
This subclass is indented under subclass 85.01. Subject matter in which the actuating device includes a fluid motor through which the fluid affects the state of the power-transmitting device, the fluid motor being rotatable relative to both the driving and driven parts.
- 85.49 And aligned with clutch axis of rotation:**
This subclass is indented under subclass 85.48. Subject matter in which the fluid motor includes an actuating element that moves, under the pressure of the fluid, along a line coaxial with the axis of rotation of the driving part or driven part.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
85.05+, 85.2+, and 85.15, for other actuator configurations for producing axial displacement of a clutch element.
- 85.5 Operator acts on clutch through push rod extending coaxially through input or output shaft:**
This subclass is indented under subclass 85.49. Subject matter in which the fluid motor affects the state of the power-transmitting device by moving an elongated element that is coaxial with and extends through a hollow shaft integral with one of the driving and driven parts.

- 85.51 Operator acts on clutch via diaphragm spring or lever:**
This subclass is indented under subclass 85.49. Subject matter in which the fluid motor affects the state of the power-transmitting device through a radially slit spring having plural fingers or through a set of levers that extend radially of the axis of rotation of the driving part or driven part.
- 85.52 Pull-to-release type clutch:**
This subclass is indented under subclass 85.51. Subject matter in which portions of the fingers or levers move with the actuating element of the fluid motor and in which fluid induced motion of the actuating element of the fluid motor in a direction generally away from power-transmitting elements of the power-transmitting device and toward the fluid motor places the power-transmitting device in a state in which it does not transmit power between the driving and driven parts.
- 85.53 Details of fluid operator:**
This subclass is indented under subclass 85.49. Subject matter including details of the fluid motor.
- 85.54 Having particular seal:**
This subclass is indented under subclass 85.53. Subject matter including details of means for preventing leakage of fluid within or from the fluid motor.
- 85.55 Details of master cylinder:**
This subclass is indented under subclass 85.49. Subject matter including details of a piston and cylinder mechanism that pressurizes the fluid to cause it to act on the fluid motor.
- 85.56 Operator spaced from and parallel to clutch axis of rotation:**
This subclass is indented under subclass 85.48. Subject matter in which the fluid motor includes an actuating element that moves, under the pressure of the fluid, along a line that is parallel to the axis of rotation of the driving part or driven part.
- 85.57 Fluid released clutch:**
This subclass is indented under subclass 85.48. Subject matter in which the power-transmitting device is transitioned out of the state in which power is transmitted between the driving and driven members (i.e., disengaged) under power of the fluid motor.
- 85.58 By vacuum:**
This subclass is indented under subclass 85.57. Subject matter in which the pressure of fluid that powers the fluid motor is less than the pressure of fluid surrounding the fluid motor.
- 85.59 Details of fluid operator:**
This subclass is indented under subclass 85.48. Subject matter including details of the fluid motor.
- 85.6 Details of master cylinder:**
This subclass is indented under subclass 85.48. Subject matter including details of a piston and cylinder mechanism that pressurizes the fluid to cause it to act on the fluid motor.
- 85.61 Cooling or lubricating:**
This subclass is indented under subclass 85.01. Subject matter in which the power-transmitting device includes features for facilitating removal of heat from the power-transmitting device or for directing a lubricant into, out of, or through the power-transmitting device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
113.1+, for clutch cooling and lubricating means, per se.
- 85.62 Having wear compensator:**
This subclass is indented under subclass 85.01. Subject matter in which the power-transmitting device includes means to mitigate the effect on the operation of the power-transmitting device of dimensional changes in components thereof that occur with repeated use.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
70.251+, for a clutch having means for adjusting the position of a friction element relative to friction element moving means for compensating for wear of the friction element.
111.1+, for wear compensators, per se.

- 85.63 Including fluid pressure control:**
This subclass is indented under subclass 85.01. Subject matter including means to regulate, set, or modulate the pressure of the fluid that powers the actuating device.
- 89.1 Weight operated:**
This subclass is indented under subclass 82. Structure, wherein an operating mechanism of the clutch is activated by gravitational force.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
103+, for a clutch in which a weight is acted on by centrifugal force, acceleration, or inertia to operate a speed-responsive clutch.
- 89.2 Spring engaged:**
This subclass is indented under subclass 82. Structure, wherein the clutch is operated to the engaged position by a resilient means.
- 89.21 Cam release:**
This subclass is indented under subclass 89.2. Structure, wherein an element having an eccentric surface or groove is employed to release the clutch in opposition to the resilient means.
- 89.22 Belleville disc spring:**
This subclass is indented under subclass 89.2. Structure, wherein the resilient means is a relatively thin, resilient annular disc that is dished or tapered in shape.
- 89.23 Push-type:**
This subclass is indented under subclass 89.22. Structure, wherein the disc spring has radially, inwardly directed fingers and is fulcrumed such that the fingers are moved in a direction axially toward a clutch plate in order to release engagement.
- 89.24 Pull-type:**
This subclass is indented under subclass 89.22. Structure, wherein the disc spring has radially, inwardly directed fingers and is fulcrumed such that the fingers are moved in a direction axially away from a clutch plate in order to release engagement.
- 89.25 Geometric configuration:**
This subclass is indented under subclass 89.22. Structure, wherein significance is attributed to a specific shape of the spring structure.
- 89.26 Plural coil springs spaced from clutch axis:**
This subclass is indented under subclass 89.2. Structure, wherein the engaging force is provided by a multiplicity of helical springs having axes positioned radially spaced from the clutch axis.
- 89.27 Coil spring coaxial to clutch axis:**
This subclass is indented under subclass 89.2. Structure, wherein the resilient means is a helical spring concentric with the clutch axis.
- 89.28 Transversely engaged:**
This subclass is indented under subclass 89.27. Structure, wherein an engaging element moves transversely to the axis of the rotation of the clutch.
- 89.29 Quick throw spring:**
This subclass is indented under subclass 89.2. Structure, wherein a mechanism initially deflects or compresses a spring after which the spring force is released allowing it to quickly move the clutch into the engaged position.
- 90 Electric release:**
This subclass is indented under subclass 89.2. Devices in which electric action is employed to release the clutch.
- 92 One-direction apply and release:**
This subclass is indented under subclass 82. Devices in which the clutch is operated to engagement and release by successive movements of the operator in the same direction.
- 93 Cam:**
This subclass is indented under subclass 82. Devices in which the clutch is operated to engaging position by some form of cam.
- 94 Screw:**
This subclass is indented under subclass 82. Devices in which the clutch is operated to engaging position by a screw.

- 95 Handwheel:**
This subclass is indented under subclass 82. Devices in which some form of rotating manually-controlled handle is used to operate the clutch.
- 96 Central pin:**
This subclass is indented under subclass 82. Devices in which a pin or rod in the axle of rotation operates the clutch.
- 97 Screw operated:**
This subclass is indented under subclass 96. Devices in which the central pin operator is actuated by a screw.
- 98 Shipper saddles:**
This subclass is indented under subclass 82. Devices which include elements known as "shipper-saddles" for operating the clutch.
- 99 Lever systems:**
This subclass is indented under subclass 82. Devices includes a simple lever or combination of levers for actuating the clutch.
- 100 Follow-up:**
This subclass is indented under subclass 82. Devices in which the same device operates the clutch and continues to operate the shaft after the clutch is in engagement.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
19, for combined clutch and brake operated by the drive shaft.
- 101 Releasing:**
This subclass is indented under subclass 82. Devices for moving the clutch to an inoperative position.
- 102 Check of driven member:**
This subclass is indented under subclass 82. Devices which, upon the driven member or operated connection being stopped or checked, positively operates the clutch to released position.
- SEE OR SEARCH CLASS:
123, Internal-Combustion Engines, subclasses 185.1+ for cranking devices for engines.
- 103 Speed responsive:**
This subclass is indented under subclass 82. Devices for operating the clutch in response to speed.
- 104 Fixed-speed release:**
This subclass is indented under subclass 103. Devices in which speed-responsive elements are so arranged as to produce slipping of the clutch if the critical speed is exceeded.
- 105 Fixed-speed engagement:**
This subclass is indented under subclass 103. Devices in which speed responsive elements are arranged to produce engagement of the clutch when the driving member reaches a pre-determined speed.
- 106 Release:**
This subclass is indented under subclass 103. Devices include speed-responsive devices to prevent an unauthorized engagement of a clutch.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
85.25, for a fluid-operated clutch having a balance chamber for counteracting the effects of rotation-induced pressure in the operating fluid.
- 107 Engaging surfaces:**
This subclass is indented under the unnumbered subclass, ELEMENTS. Devices under Elements which include modifications of the engaging surfaces of clutches.
- (1) Note. Where the clutch or element is claimed with no significant clutch or element structure, but merely in terms of the composition or material of which it is composed, it will be classified in the appropriate composition or material class, even though there is no claim to the composition, per se. In this connection, the following classes under Search Class, below, should be considered.
- (2) Note. A patent directed to a product with a frictional property, where said property is enhanced by claimed structure (external structure (e.g., disc, zones of friction material; particular arrangement of

strands, fibers or layers), will be placed in this Class (192) rather than in Class 428, Stock Material or Miscellaneous Articles, where the sole use disclosure is as a clutch or brake.

SEE OR SEARCH CLASS:

- 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclass 231 for a composition having a continuous phase of free metal made by consolidating metal particles and containing a functionally defined nonmetal constituent, e.g., abrasive. (See (1) Note, above.)
- 106, Compositions: Coating or Plastic, note particularly the class definition of Class 106 for the classification of other compositions. (See (1) Note, above.)
- 106, Compositions: Coating or Plastic, subclass 36 for tractive or friction surface compositions.
- 148, Metal Treatment, particularly subclasses 400+ for materials which are products of processes of treating metal classifiable in Class 148, or for products distinguished only by the internal structure or characteristics of the metals, metallic compositions or alloys comprising such products. (See (1) Note, above.)
- 252, Compositions, for compositions not elsewhere classified. (See (1) Note, above.)
- 420, Alloys or Metallic Compositions, appropriate subclasses for articles defined only by their alloy or metallic composition. (See (1) Note, above.)
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a stock material product in the form of a single or plural layer web or sheet not elsewhere provided for and especially subclasses 64.1+ for a circular sheet, subclasses 196+ and 225+ for such a product embodying mechanically interengaged strands (e.g., weave, knit, etc.), and subclasses 364+ for a rod, strand, fiber or filament with structure (e.g., nonlinear, etc.), or

coated. (See (1) Note, above and (2) Note, above.)

- 520, Synthetic Resins or Natural Rubbers, appropriate subclasses, particularly Class 523, subclass 152 for a composition containing a synthetic resin or natural rubber having utility as a friction element for automobiles, trains, trailers, roller skates, skateboards, or other wheeled vehicles or to processes of preparing said composition. (See (1) Note, above.)

108 Positive:

This subclass is indented under subclass 107. Devices pertaining to improvements in the engaging faces of interlocking or positively engaged clutches.

109 Thrust members, retarders, and stops:

Devices under Elements including thrust members for cushioning the engagement of clutches, retarders for delaying the action, and stops for defining the limits of movement.

110 Shafts, bearings, and adjusting devices:

Devices under Elements including shafts and bearings for clutches and adjusting devices other than provided for in the next subclass.

111.1 Wear compensators:

This subclass is indented under the class definition. Device including an adjusting mechanism to compensate for the effect on the engagement of a clutch of dimensional changes in components of the clutch that occur with use.

SEE OR SEARCH THIS CLASS, SUBCLASS:

70.251+, for a clutch having three or more coaxial clutch members and means to compensate for wear of the clutch members.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 79.5+ for wear compensators for transversely movable wheel brakes.

111.11 Compensator in actuating mechanism outside of the clutch:

This subclass is indented under subclass 111.1. Device in which the adjusting mechanism is

located in an assembly for operating the device that is not in the immediate vicinity of engaging members of the clutch.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 500.5+ for a control cable that may include an adjusting mechanism.

111.12 Automatic:

This subclass is indented under subclass 111.11. Device in which the adjusting mechanism operates without human assistance or intervention beyond that which occurs during normal use of the clutch.

111.13 Compensator in or near release bearing:

This subclass is indented under subclass 111.1. Device having a disengagement element to disengage the clutch and in which the adjusting mechanism is part of or located adjacent to and cooperates with the disengagement element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

98, for a "shipper-saddle" type of clutch operating element.

111.14 Automatic:

This subclass is indented under subclass 111.1. Device in which the adjusting mechanism operates without human assistance or intervention beyond that which occurs during normal use of the clutch.

111.15 Compensator on or inside clutch cover (e.g., acting on diaphragm or pressure plate):

This subclass is indented under subclass 111.1. Device in which the clutch has engaging members and an enclosing structure integral with one of the engaging members and surrounding another of the engaging members, the adjusting mechanism being located on or inside the enclosing structure.

111.16 Automatic:

This subclass is indented under subclass 111.15. Device in which the adjusting mechanism operates without human assistance or intervention beyond that which occurs during normal use of the clutch.

111.17 Worm mechanism:

This subclass is indented under subclass 111.16. Device in which the adjusting mechanism includes a helical surface rotatable about its axis, the surface contacting and moving an element that is not coaxial with the helical surface to compensate for the dimensional changes of the clutch components.

111.18 Relatively rotatable cam rings:

This subclass is indented under subclass 111.16. Device in which the adjusting mechanism comprises a pair of annular members coaxial with each other and with input and output shafts of the clutch, the annular members having mutually engaging surfaces inclined relative to a plane perpendicular to their axis, rotation of the annular members relative to each other causing an increase in the axial spacing of the annular members to compensate for the dimensional changes of the clutch components.

111.19 Between cover and diaphragm spring:

This subclass is indented under subclass 111.18. Device including an annular, radially slit spring (often referred to as a membrane spring or a diaphragm spring) for moving the engaging members toward one another, the adjusting mechanism being located between the spring and the enclosing structure and the adjusting mechanism transmitting a force between the spring and the enclosing structure to position a region of the spring at a distance from the enclosing structure determined by the relative rotational positions of the annular members.

111.2 Between diaphragm spring and pressure plate:

This subclass is indented under subclass 111.18. Device including an annular, radially slit spring (often referred to as a membrane spring or a diaphragm spring) for moving the engaging members toward one another, the adjusting mechanism being located between the spring and the engaging members and the annular members transmitting a force between the spring and the engaging members tending to urge the engaging members toward one another.

111.3 Having clearance sensor bridging gap between clutch members and moveable only during engagement:

This subclass is indented under subclass 111.2. Device including a wear sensor mounted on a first one of the engaging members, movable relative to it, extending from it toward a second one of the engaging members, passing through a plane containing a friction surface of the first engaging member, and engaging the second engaging member at a location on the opposite side of the plane from the first engaging member, the wear sensor being moved relative to the first engaging member only as the members approach rotation-transmitting mutual engagement, the position of the wear sensor relative to the first engaging member determining the amount of compensation that the adjusting mechanism provides.

- (1) Note. The wear sensor need not be moved relative to the first engagement member every time the members approach rotation-transmitting mutual engagement. Movement of the wear sensor typically only occurs after a sufficient amount of wear (change of thickness) of the engaging members has occurred.

111.4 Having clearance sensor bridging gap between clutch members and moveable only during engagement:

This subclass is indented under subclass 111.16. Device including a wear sensor mounted on a first one of the engaging members, movable relative to it, extending from it toward a second one of the engaging members, passing through a plane containing a friction surface of the first engaging member, and engaging the second engaging member at a location on the opposite side of the plane from the first engaging member, the wear sensor being moved relative to the first engaging member only as the members approach rotation-transmitting mutual engagement, the position of the wear sensor relative to the first engaging member determining the amount of compensation that the adjusting mechanism provides.

- (1) Note. The wear sensor need not be moved relative to the first engagement

member every time the members approach rotation-transmitting mutual engagement. Movement of the wear sensor typically only occurs after a sufficient amount of wear (change of thickness) of the engaging members has occurred.

111.5 Relatively rotatable cam rings:

This subclass is indented under subclass 111.15. Device in which the adjusting mechanism comprises a pair of annular members coaxial with each other and with input and output shafts of the clutch, the annular members having mutually engaging surfaces inclined relative to a plane perpendicular to their axis, rotation of the annular members relative to each other causing an increase in the axial spacing of the annular members to compensate for the dimensional changes of the clutch components.

111.6 Threaded element centered on clutch axis:

This subclass is indented under subclass 111.15. Device in which the adjusting mechanism comprises an axially adjustable element threaded onto a cooperating structure and rotatable relative thereto about the axis of rotation of input and output shafts of the clutch such that the relative rotation compensates for the dimensional changes of the clutch components.

111.7 Threaded in clutch cover:

This subclass is indented under subclass 111.6. Device in which the cooperating structure is the enclosing structure of the clutch.

112 Casings:

Devices under Elements, including liquid-tight casings to entirely enclose the clutch.

113.1 Lubricating, insulating, or cooling:

This subclass is indented under subclass 103. Subject matter, which includes means for reducing the friction or affecting temperature of a clutch.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85.61, for cooling or lubricating means for a fluid-operated clutch.

113.2 Air cooling:

This subclass is indented under subclass 113.1. Subject matter, in which air is a cooling medium.

113.21 Heat radiating structure:

This subclass is indented under subclass 113.2. Structure, which includes an element for increasing radiation of heat away from the clutch to ambient air (e.g., having "fins", etc.).

113.22 Grooved surfaces:

This subclass is indented under subclass 113.2. Structure, wherein engaging clutch surfaces are striated to facilitate the flow of cooling air.

113.23 Air directing structure:

This subclass is indented under subclass 113.2. Structure, including a member which is contoured to forcibly direct the flow of cooling air through or around clutch elements.

113.24 Rotating cover:

This subclass is indented under subclass 113.23. Subject matter, wherein the air directing structure is a part of a rotating encasement for the clutch.

- (1) Note. Air directing structure in a fixed clutch housing in general would be properly classified in this class, subclass 113.23.

113.25 Spring:

This subclass is indented under subclass 113.23. Subject matter, wherein the air directing structure is a part of a clutch spring.

113.26 Clutch plate:

This subclass is indented under subclass 113.23. Subject matter, wherein the air directing structure is a part of a clutch plate.

113.3 Liquid cooled or lubricated clutch surfaces:

This subclass is indented under subclass 113.1. Structure, wherein a liquid is used to reduce friction or temperature of the clutch.

113.31 Entire coolant path is spaced from clutch surfaces:

This subclass is indented under subclass 113.3. Subject matter, wherein a passageway for a coolant is spaced from engaging surfaces of the clutch throughout its whole length.

SEE OR SEARCH THIS CLASS, SUBCLASS:

113.34+, for coolant passing between engaging clutch surfaces.

113.32 Overrunning clutch:

This subclass is indented under subclass 113.3. Subject matter, which includes clutch elements which automatically engage in response to relative rotation of the elements in one direction and which disengage automatically in response to relative rotation in an opposite direction.

113.33 Positive:

This subclass is indented under subclass 113.3. Subject matter, which includes intermeshing elements for interconnection of said elements without slippage.

113.34 Lubricant or coolant between engaging surfaces:

This subclass is indented under subclass 113.3. Structure, including means for supplying lubricant or coolant between engagable clutch surfaces (e.g., during slip or disengagement).

113.35 With change of coolant flow during disengagement:

This subclass is indented under subclass 113.34. Structure, having means to increase, decrease, or redirect coolant flow during clutch disengagement.

113.36 Grooved surfaces:

This subclass is indented under subclass 113.34. Structure, wherein the engagable clutch surfaces are striated to facilitate lubricant or coolant flow.

113.4 Thermal insulation:

This subclass is indented under subclass 113.1. Structure, wherein a thermal break is provided between heat generating engaging surfaces and other elements of the clutch.

113.5 Lubrication of ancillary clutch parts:

This subclass is indented under subclass 113.1. Subject matter, wherein means is provided to lubricate elements of the clutch other than friction surfaces (e.g., to lubricate bearings or operating mechanism).

114 Locks:

Devices under Elements for maintaining the clutch in any set position.

SEE OR SEARCH THIS CLASS, SUBCLASS:

70.22, for opposed clutch faces having means to effect the engagement of the clutch faces and means to lock the elements together.

115 Supports:

Devices under Elements for supporting clutches and power-stop control devices.

116.5 STOP MECHANISM:

This subclass is indented under the class definition. Mechanisms usually automatic in operation, for stopping a machine when a predetermined result is reached when some part of the machine fails to function, or the material fails or is disarranged, or when an operator's position renders him liable to injury.

(0.5) Note. This subclass includes devices having an electric motor drive where a mechanical stop mechanism stops the drive independently of any motor control or deenergization, even though the stopping of the drive incidently causes control or deenergization of the motor.

(1) Note. For organizations and constructions of the machines, such as presses, winding machines, etc., to which the stop mechanism is applied, see appropriate art class.

SEE OR SEARCH CLASS:

100, Presses, subclasses 341 through 352 for a press not provided for elsewhere having a safety control system and subclass 353 for a press not provided for elsewhere having an interrelated control system.

118, Coating Apparatus, subclasses 663+ for coating apparatus having automatic control means.

188, Brakes, subclasses 82.1+ for one-way brakes applied to elements rotating relative to stationary element to prevent retrograde rotation and see the notes thereto for other one-way brakes.

241, Solid Material Comminution or Disintegration, subclass 36 for automatic power stop mechanisms applied to significantly included comminution.

318, Electricity: Motive Power Systems, subclasses 466+ and 477 for electric driven motor devices combined with a mechanical stop mechanism and the stopping operation requires control of the motor as well as operation of the stop mechanism. See Note (0.5).

369, Dynamic Information Storage or Retrieval, subclass 79 for a phonograph cabinet closure braking actuator; and subclasses 232 and 234+ for phonograph braking by record structure actuation, and mechanism condition actuation, respectively.

125 Material control:

This subclass is indented under subclass 116.5. Stop mechanisms in which the starting or stopping of the machine is effected by some condition of the material being treated.

SEE OR SEARCH CLASS:

19, Textiles: Fiber Preparation, subclasses .2+ for stopping of machines that prepare fibers for making textiles.

26, Textiles: Cloth Finishing, subclasses 10+ for stopping of machines cutting pile loops.

28, Textiles: Manufacturing, subclasses 186+ for stopping of warp preparing machines; and 225, for knot or slub detectors in thread finishing machines.

53, Package Making, appropriate subclasses for methods of and apparatus for encompassing or encasing goods or materials with a separate cover or band which serves as means for iden-

- tifying, protecting or unit handling the goods or materials, particularly subclasses 55+ for concurrent controls of contents and cover feeds (subclasses 56+ being directed to manually reset stopping under the control of the contents), subclasses 493+ for contents feed controls, subclasses 64+ for cover feed or cover adjunct feed or application control, and subclasses 75+ for end closing control.
- 57, Textiles: Spinning, Twisting, and Twining, subclasses 80+ for strand controlled stopping of spinning and twisting machines.
- 66, Textiles: Knitting, subclasses 157+ for stopping of a knitting machine.
- 72, Metal Deforming, subclasses 3+ for a metal shaping machine which includes means to sense a condition of the work or product and exert a control operation to stop the machine in response thereto, and subclasses 10+ for the same where the result is an operation other than stopping.
- 87, Textiles: Braiding, Netting, and Lace Making, subclasses 18+ for stopping mechanisms for braiding, netting and lace making machines.
- 139, Textiles: Weaving, subclasses 336+ for stopping mechanisms for looms.
- 198, Conveyors: Power-Driven, appropriate subclasses including 572+ and 855+ for conveyors in which the material handled controls the drive for the conveyor.
- 226, Advancing Material of Indeterminate Length, especially subclass 37 for a strand or web feeding device which is controlled by the material being moved.
- 242, Winding, Tensioning, or Guiding, subclasses 472.9+, 479.9+, 484.8, 484.9+, 534+, and 563+ for a stop or detector for a winding or unwinding device.
- 126 Sheet material:**
This subclass is indented under subclass 125. Stop mechanisms in which the material is in the form of sheets.
- SEE OR SEARCH CLASS:
53, Package Making, appropriate subclasses for methods of and apparatus for encompassing or encasing goods or materials with a separate cover or band which serves as means for identifying, protecting or unit handling the goods or materials, particularly subclasses 55+ for concurrent controls of contents and cover feeds (subclasses 64+ for cover feed or cover adjunct feed).
- 271, Sheet Feeding or Delivering, subclasses 258+ for a device for stopping the feed of sheets.
- 127 Electrical:**
This subclass is indented under subclass 126. Stop mechanisms in which the control is through an electrical agency.
- SEE OR SEARCH CLASS:
87, Textiles: Braiding, Netting, and Lace Making, subclass 19 for electrical control stopping of braid, net or lace making machines.
- 271, Sheet Feeding or Delivering, subclasses 258+ for a device for stopping the feed of sheets.
- 128 Pneumatic:**
This subclass is indented under subclass 126. Stop mechanisms in which the control is through a pneumatic agency.
- 129 Safety device:**
This subclass is indented under subclass 116.5. Stop mechanisms which operate to interrupt the drive, render the starting mechanism inoperative, or otherwise prevent operation of the machine, as a safety expedient.
- SEE OR SEARCH CLASS:
65, Glass Manufacturing, subclass 159, for an apparatus safety device in glassworking apparatus.
- 470, Threaded, Headed Fastener, or Washer Making: Process and Apparatus, subclass 43 for safety devices with bolt and rivet making machines.

- 130 Hand protector:**
This subclass is indented under subclass 129. Safety devices in which the control of the movement of the work element of the machine prevents injury to the hand of the operator.
- 131 Two hand:**
This subclass is indented under subclass 130. Safety devices in which both hands of the operator are required to start or maintain the operation of the machine, so that they are kept out of the danger zone.
- SEE OR SEARCH CLASS:
100, Presses, subclass 344 for a press having a safety device which employs the use of both hands to start up the press, where the details of the press is more than nominally claimed.
- 132 Delayed action drive:**
This subclass is indented under subclass 130. Safety devices in which positive driving connection for the work element is made only just prior to contact of the work element with the work.
- 133 Automatic guard:**
This subclass is indented under subclass 129. Safety devices in which guards interlock with the power element of the machine to prevent the starting or the operative functioning of the machine or to throw out the drive when abnormal conditions exist.
- 134 Punch-press type:**
This subclass is indented under subclass 133. Safety devices in which the punch press type of machine is involved.
- SEE OR SEARCH CLASS:
72, Metal Deforming, subclasses 1+ for randomly-actuated stopping of a metal deforming machine.
74, Machine Element or Mechanism, subclasses 613+ for guard mechanisms which do not depend upon the control of the machine.
100, Presses, subclasses 341 through 352 for a safety device in a press where the details of the press is more than nominally claimed.
- 135 Cover:**
This subclass is indented under subclass 133. Safety devices in which the cover of the machine is involved.
- 136 Centrifugal-machine type:**
This subclass is indented under subclass 135. Safety devices in which the machine is of the centrifugal type.
- 137 Disabled transmission:**
This subclass is indented under subclass 133. Safety devices in which the power-transmitting connections are disabled upon the guard striking an extraneous object.
- 138 Limit stop:**
This subclass is indented under subclass 116.5. Stop mechanisms in which the drive of the machine is discontinued at the limit of travel.
- SEE OR SEARCH CLASS:
57, Textiles: Spinning, Twisting, and Twining, subclass 79 for spinning machines which are stopped after sufficient material has been wound in a package.
74, Machine Element or Mechanism, subclasses 10+ for mechanical dial operators and see (2) Note to the definition of subclass 10 for the line between these two classes.
91, Motors: Expansible Chamber Type, subclasses 220+ for cyclically operable expansible chamber motors having condition responsive stop means.
112, Sewing, subclass 67 for starting and stopping of a buttonhole machine and subclasses 271-277 for sewing machine stopping elements.
140, Wireworking, for wire feeders having stop devices.
187, Elevator, Industrial Lift Truck, or Stationary Lift for Vehicle, subclasses 282+ and 302+ for control means for an elevator car actuated by the car contacting a trip in the shaft.
212, Traversing Hoists, subclasses 116, 280, 286, and 329 for automatic stops for traversing hoists.
235, Registers, subclass 132 for registers which actuate control means upon

- attainment of a predetermined reading of the register.
- 254, Implements or Apparatus for Applying Pushing or Pulling Force, subclass 269 for apparatus for hauling or hoisting a load, including a cable-pulling drum which is driven around its rotational axis and a stationary mechanism for generating a control impulse to a rotation-retarding means of the drive for the drum; the mechanism is actuated by the load or another obstruction on and traveling with the cable.
- 369, Dynamic Information Storage or Retrieval, subclasses 234+ for similar subject matter in a phonograph.
- 408, Cutting by Use of Rotating Axially Moving Tool, subclasses 139+ for cutting means of that class type combined with clutch structure disengageable by tool movement.
- 409, Gear Cutting, Milling, or Planing, subclass 342 for a stop mechanism for a tool feed of a metal planing machine.
- 414, Material or Article Handling, subclass 674, for automatic stops for hoists.
- 139 Rotary-member control:**
This subclass is indented under subclass 138. Stop mechanisms in which stopping is controlled by a rotary member of the machine.
- 140 Speed responsive:**
This subclass is indented under subclass 139. Stop mechanisms in which the control is through the speed of the machine.
- 141 Screw:**
This subclass is indented under subclass 139. Stop mechanisms in which control is by a screw operated by the machine.
- 142 Electrical:**
This subclass is indented under subclass 139. Stop mechanisms in which stopping is controlled by electrically-actuated elements.
- SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclasses 466+ for electric motor starting and stopping in response to movement, position or limit of travel of motor or other body or device.
- 143 Reciprocating-member control:**
This subclass is indented under subclass 138. Stop mechanisms in which stopping is controlled by a reciprocating member.
- 144 Drive release and brake:**
This subclass is indented under subclass 116.5. Stop mechanisms in which the drive is automatically released and the brake automatically applied.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
8, for brakes which are applied upon cessation of the drive.
- 145 Multiple clutch:**
This subclass is indented under subclass 144. Stop mechanisms in which a plurality of clutches are involved in the control of the machine.
- 146 Change speed:**
This subclass is indented under subclass 144. Stop mechanisms in which the speed is automatically reduced in successive stages before final stopping occurs.
- 147 Speed responsive:**
This subclass is indented under subclass 144. Stop mechanisms in which the control of the drive release and brake is in response to speed.
- 148 Positive stop:**
This subclass is indented under subclass 144. Stop mechanisms in which the moving parts of the machine are brought to rest by a positive stop.
- 149 Cushioned:**
This subclass is indented under subclass 148. Stop mechanisms in which the positive stop is combined with a cushion element.
- 150 Overload release:**
This subclass is indented under subclass 116.5. Stop mechanisms in which some part of the power or power and current connection is automatically disengaged upon occurrences of an overload.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

56.1+, for clutches which release upon overload.

SEE OR SEARCH CLASS:

81, Tools, subclasses 467+ for wrenches or screwdrivers which yield upon a selected torque being reached.

241, Solid Material Comminution or Disintegration, subclass 32, for overload release devices associated with comminutors.

318, Electricity: Motive Power Systems, subclass 434 for electric motor systems including a yieldable member in the mechanical output of the motor with means actuated by the yieldable member for controlling the motor other than by deenergization to limit the motor load, current or torque, and subclasses 474+, for electric motor systems including a yieldable member in the output of the motor with means actuated by the yieldable member for deenergizing the motor.

200 Clutch element resiliently carried on hub:
Device under ELEMENTS wherein a clutch-engaging member is rotatable about an axis and has a friction surface which is mounted on a hollow cylindrical component by recoilably yieldable means that connect the member to the component.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

55.2+, for a combination of a resiliently mounted clutch-element and such structure as is necessary to form an operative clutch assemblage other than as provided for in subclass 70.17.

70.17+, for a combination of resiliently mounted clutch-element and such structure as is necessary to form an operative multidisc clutch assemblage as defined in (1) Note under subclass 70.11.

SEE OR SEARCH CLASS:

464, Rotary Shafts, Gudgeons, Housings and Flexible Couplings for Rotary Shafts, subclasses 51+, for a resilient connection, per se, between a shaft and a driven member such as a clutch.

201 Speed-responsive:

This subclass is indented under subclass 200. Subject matter wherein structure is provided for affecting the degree of resilience of the clutch engaging member relative to the cylindrical component in response to the rate of rotation thereof.

202 Manually adjustable:

This subclass is indented under subclass 200. Subject matter wherein structure requiring manipulation is provided for varying the degree of resiliency of the clutch engaging member relative to the cylindrical component.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

110, for adjusting devices, per se.

203 Coil spring detail:

This subclass is indented under subclass 200. Subject matter wherein the recoilably yieldable means comprises an elongated resilient member formed into a helix and the shape or material of the resilient member is cited as significant.

SEE OR SEARCH CLASS:

267, Spring Devices, subclasses 166+ for coil springs, per se.

204 Specified bushing:

This subclass is indented under subclass 200. Subject matter wherein a sleeve or plain bearing is disposed between the hub and a member to which a friction surface is affixed to maintain concentricity between the hub and member and the shape or material of the sleeve or bearing is cited as significant.

SEE OR SEARCH CLASS:

384, Bearings, subclasses 129+ for a rotary plain bearing, per se.

- 205 Separate seat detail:**
This subclass is indented under subclass 200. Subject matter wherein a separate disc or cup is provided at an end of the recoilably yieldable means.
- SEE OR SEARCH CLASS:
267, Spring Devices, subclasses 170+ for a spring end thrust member.
- 206 Relatively axially movable hub sections:**
This subclass is indented under subclass 200. Subject matter wherein the hollow cylindrical component comprises at least two parts which are displaceable with respect to one another in a direction parallel to the axis of rotation.
- 207 Circumferential resilience:**
This subclass is indented under subclass 200. Subject matter wherein the recoilably yieldable means deforms to permit limited relative rotation between the friction surfaces and the hollow cylindrical component in a plane perpendicular to the axis of rotation.
- 208 With fluid damping:**
This subclass is indented under subclass 207. Subject matter wherein a liquid or gas is provided to affect the relative rotation.
- SEE OR SEARCH CLASS:
464, Rotary Shafts, Gudgeons, Housings and Flexible Couplings for Rotary Shafts, subclasses 24+ for a flexible coupling in which a liquid or gas is used to affect or effect the coupling.
- 209 Nonmetallic:**
This subclass is indented under subclass 207. Subject matter wherein the recoilably yieldable means includes at least one elastomeric member.
- SEE OR SEARCH CLASS:
267, Spring Devices, subclass 153 for a spring device comprising an elastomeric body, per se.
- 210 Interposed friction element:**
This subclass is indented under subclass 209. Subject matter wherein a separate element is provided between a face of a member carrying the friction surface and a generally radial face of a member carried by the cylindrical component, said element in rubbing contact with at least one of the faces.
- 210.1 Biasing means:**
This subclass is indented under subclass 210. Subject matter wherein the element is urged into rubbing contact with at least one face by a separate spring member.
- 211 And coil spring:**
This subclass is indented under subclass 209. Subject matter wherein the recoilably yieldable means further includes at least one elongated resilient member formed into a helix.
- 212 Coil spring:**
This subclass is indented under subclass 207. Subject matter wherein the recoilably yieldable means includes at least one elongated resilient member formed into a helix.
- 213 Plural helical coil spring damping stages:**
This subclass is indented under subclass 212. Subject matter wherein the recoilably yieldable means includes at least two elongated resilient members each formed into a helix and wherein for a first range of angles of relative rotation at least one of the resilient members acts to oppose the relative rotation with a first force and for a second range of angles of relative rotation at least one other of the resilient members acts to oppose further relative rotation with a second net force which differs from the first force.
- (1) Note. The at least two resilient members provide at least two damping stages which may be due to different spring stiffnesses or to a summing of the force of a second resilient member with the force of a first member after a predetermined clearance between an end of the second resilient member and a member which acts to compress the resilient member is taken up.
- 213.1 Plural axially spaced springs:**
This subclass is indented under subclass 213. Subject matter wherein a first helical resilient member has a centerline disposed a predetermined distance from a centerline of a second helical resilient member in a direction parallel to the axis of rotation.

213.11 Interposed friction element:

This subclass is indented under subclass 213.1. Subject matter wherein a separate element is provided between a face of a member carrying the friction surface and a generally radial face of a member carried by the cylindrical component, said element in rubbing contact with at least one of the faces.

213.12 Biasing means:

This subclass is indented under subclass 213.11. Subject matter wherein the element is urged into rubbing contact with at least one face by a separate spring member.

213.2 Plural radially spaced springs in a common radial plane:

This subclass is indented under subclass 213. Subject matter wherein a first helical resilient member has a centerline disposed a predetermined distance from a centerline of a second helical resilient member in a common plane perpendicular to the axis of rotation.

- (1) Note. If the centerline of the first and second resilient members are also spaced from one another in a direction parallel to the axis of rotation, classification in subclasses 213.1+ is proper.

213.21 Interposed friction element:

This subclass is indented under subclass 213.2. Subject matter wherein a separate element is provided between a face of a member carrying the friction surface and a generally radial face of a member carried by the cylindrical component, said element in rubbing contact with at least one of the faces.

213.22 Biasing means:

This subclass is indented under subclass 213.21. Subject matter wherein the element is urged into rubbing contact with one face by a separate spring member.

213.3 Interposed friction element:

This subclass is indented under subclass 213. Subject matter wherein a separate element is provided between a face of a member carrying the friction surface and a generally radial face of a member carried by the cylindrical component, said element in rubbing contact with at least one of the faces.

213.31 Biasing means:

This subclass is indented under subclass 213.3. Subject matter wherein the element is urged into rubbing contact with one face by a separate spring member.

214 Interposed friction element:

This subclass is indented under subclass 212. Subject matter wherein a separate element is provided between a face of a member carrying the friction surface and a generally radial face of a member carried by the cylindrical component, said element in rubbing contact with at least one of the faces.

214.1 Biasing means:

This subclass is indented under subclass 214. Subject matter wherein the element is urged into rubbing contact with one face by a separate spring member.

215 TRANSMISSION AND BRAKE:

This subclass is indented under the class definition. Subject matter including a device that receives rotary input torque from a power source and transmits the torque to an output load, combined with a device to retard or stop rotation of the output load.

- (1) Note. This subclass and indented subclasses are intended as the generic locus for combinations of torque transmitting devices and brakes not provided for elsewhere.
- (2) Note. This class and indented subclasses do not include machines and instruments or apparatuses claimed as such, for which see the appropriate art classes. This class does not include the special tools, instruments, and subcombination peculiar to the special arts and provided for in the classification of the art classes.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, especially subclass 339 for interchangeably locked gearing provided with a brake for synchronizing the speeds of the members to be engaged and subclass 411.5 for gearing provided with means for stopping or preventing rotation of a gearing element.

- 188, Brakes, appropriate subclasses for brakes, per se.
- 475, Planetary Gear Transmission Systems or Components, appropriate subclasses for combinations of planetary gear transmissions and brake devices instrumental in controlling the transmission.
- 477, Interrelated Power Delivery Controls, Including Engine Control, appropriate subclasses for structure wherein the operator of an engine regulates or is regulated by the operation of a clutch, brake, or gear transmission.
- 216 Internal resistance brake:**
This subclass is indented under subclass 215. Subject matter wherein motion is retarded by movement of a member through a medium intended to resist such movement.
- SEE OR SEARCH CLASS:
188, Brakes, subclasses 266+ for an internal resistance motion retarder, per se.
- 217 Velocipede:**
This subclass is indented under subclass 215. Combination for use on a vehicle wherein an operator propels the vehicle (e.g., by means of a pedal arrangement).
- SEE OR SEARCH CLASS:
188, Brakes, subclasses 24.11+ for a velocipede brake, per se.
- 217.1 Back-pedaling brake (e.g., coaster brake):**
This subclass is indented under subclass 217. Subject matter wherein the vehicle is propelled by turning a sprocket in one direction and a brake is actuated by turning the sprocket in the opposite direction.
- 217.2 Rotatable crank axle:**
This subclass is indented under subclass 217.1. Subject matter wherein the pedal is mounted on a sprocket which is carried by a rotatable shaft and the brake is arranged coaxially with an axis of the shaft.
- 217.3 Wheel hub:**
This subclass is indented under subclass 217.1. Subject matter wherein the brake is arranged coaxially with an axis of a hollow cylindrical member at the center of and connected to a vehicle wheel.
- 217.4 With change-speed transmission:**
This subclass is indented under subclass 217.3. Subject matter wherein the device that transmits torque to the output can be shifted to drive the output at one of a plurality of speed ratios relative to the input.
- 217.5 Plural sprockets:**
This subclass is indented under subclass 217.4. Subject matter wherein the device that transmits torque comprises a chain that can be shifted to one of a plurality of toothed discs.
- 217.6 With screw operator:**
This subclass is indented under subclass 217.3. Subject matter wherein the brake is applied by moving a member axially by means of a helical groove, slot, rib, or spline.
- 217.7 Multidisc brake:**
This subclass is indented under subclass 217.3. Subject matter wherein the brake comprises at least one plate attached to either a fixed member or the hub interposed between two other plates fixed to the other of the fixed member or the hub.
- 218 Motor vehicle:**
This subclass is indented under subclass 215. Subject matter including automobiles or other mechanisms for transporting passengers or cargo wherein the power source comprises an internal combustion engine, electric motor, or other power plant to propel the mechanism, and wherein the brake retards or stops movement of the mechanism.
- SEE OR SEARCH CLASS:
180, Motor Vehicles, appropriate subclasses for inventions relating to vehicle structure.
- 219 Transmission control affects brake:**
This subclass is indented under subclass 218. Subject matter wherein the device for retarding or stopping motion of the vehicle is influenced by a controller of the device for transmitting torque.

219.1 Hill-holder:

This subclass is indented under subclass 219. Subject matter especially adapted for preventing retrograde movement of the vehicle on an inclined surface and including means for releasing the brake in response to manipulation of the controller.

SEE OR SEARCH THIS CLASS, SUBCLASS:

13, for clutch-released brake holders.

219.2 One-way brake:

This subclass is indented under subclass 219.1. Subject matter wherein the device for retarding or stopping rotation of the output load is operable to prevent rotation only in a single rotational direction.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 82.1+ for a one-way brake, per se.

219.3 Ball or roller:

This subclass is indented under subclass 219.2. Subject matter wherein the one-way brake includes a spherical or cylindrical member which is jammed between two surfaces, one of which is fixed against rotation.

219.4 Emergency or parking brake:

This subclass is indented under subclass 219. Subject matter including structure to hold the device for retarding or stopping motion in an engaged condition even if the vehicle is unattended.

219.5 Parking pawl:

This subclass is indented under subclass 219.4. Subject matter wherein the device for retarding or stopping rotation includes a pivoting projection that engages a toothed wheel.

SEE OR SEARCH CLASS:

188, Brakes, subclass 31 for a positively locking brake.

219.6 With separate manual operator:

This subclass is indented under subclass 219.4. Subject matter wherein the structure to hold the brake includes an occupant manipulatable actuator solely for applying or releasing the brake.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 469+ for manually operated pedals and levers for controlling transmissions or brakes.

219.7 Foot operated:

This subclass is indented under subclass 219.6. Subject matter wherein the actuator is stepped on to apply and hold the brake.

220 Brake control affects transmission change:

This subclass is indented under subclass 218. Subject matter wherein the device for transmitting torque is influenced by a controller for the device for retarding or stopping motion of the vehicle.

220.1 Brake application neutralizes transmission:

This subclass is indented under subclass 220. Subject matter wherein application of the device for retarding or stopping motion of the vehicle causes the device for transmitting torque to shift to a nontorque transmitting condition.

220.2 Park-lock device:

This subclass is indented under subclass 220. Subject matter wherein a blocking device is provided to prevent a controller of the torque transmitting device from being moved from a park or neutral position unless the brake is applied.

SEE OR SEARCH CLASS:

70, Locks, subclasses 245+ for ignition lock or cylinder.

477, Interrelated Power Delivery Controls, Including Engine Control, subclasses 92+ for torque transmitting controller.

220.3 Floor-mounted shift lever:

This subclass is indented under subclass 220.2. Subject matter wherein the controller for the torque transmitting device is disposed at the base of a passenger compartment of the vehicle.

220.4 Solenoid operated lock:

This subclass is indented under subclass 220.3. Subject matter wherein the blocking device comprises an electromagnetically actuated member.

- 220.5 Rotary bushing:**
This subclass is indented under subclass 220.4. Subject matter wherein the electromagnetically actuated member causes a cylindrical collar to be pivoted to an unblocked position.
- 220.6 Override:**
This subclass is indented under subclass 220.5. Subject matter wherein an additional manual canceling arrangement is provided to pivot the collar to the unblocked position in the event of failure of the electromagnetically actuated member.
- 220.7 Override:**
This subclass is indented under subclass 220.4. Subject matter wherein an additional manual canceling arrangement is provided to pivot the collar to the unblocked position in the event of failure of the electromagnetically actuated member.
- 221 Fluid operated:**
This subclass is indented under subclass 218. Subject matter wherein the transmission or brake is operated by a hydraulic or pneumatic mechanism.
- 221.1 Brake and gearing at axle end:**
This subclass is indented under subclass 221. Subject matter wherein a change speed transmission and a brake device are both disposed within the wheel hub.
- 222 Electromagnetic:**
This subclass is indented under subclass 218. Subject matter wherein the transmission or brake is operated by an electric or magnetic mechanism.
- 223 Torque-responsive brake:**
This subclass is indented under subclass 215. Subject matter wherein the device to retard or stop rotation of the output load is affected by the transmission of rotational energy.
- (1) Note. This subclass includes a mechanism wherein the brake is applied when the output load attempts to drive the power source through the torque transmitting device, or is released when the power source attempts to drive the load through the brake.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
224+, for belt or chain drive.
- 223.1 Transversely engaged positive brake:**
This subclass is indented under subclass 223. Subject matter wherein the device to retard or stop rotation of the output load comprises an element that moves radially relative to an axis of rotation of a member to be braked and includes a portion which meshes with cooperating structure.
- 223.2 Ball or roller type brake:**
This subclass is indented under subclass 223. Subject matter wherein the device to retard or stop rotation of the output load comprises a spherical or cylindrical member which is jammed between two surfaces, one of which is fixed against rotation.
- 223.3 With cam mechanism for axially moving brake member:**
This subclass is indented under subclass 223. Subject matter wherein the transmission of rotational energy causes movement of an inclined surface relative to cooperating structure to effect movement of a portion of a device to retard or stop rotation of the output load which movement is parallel to an axis of rotation of a braked member.
- 223.4 Wrap-spring brake:**
This subclass is indented under subclass 223. Subject matter wherein the device to retard or stop rotation of the output load is a helically coiled resilient element which expands or contracts radially to frictionally engage a member to be braked.
- 224 Belt or chain transmission:**
This subclass is indented under subclass 215. Subject matter wherein the torque transmitting device comprises an endless flexible band.
- SEE OR SEARCH CLASS:
474, Endless Belt Power Transmission Systems or Components, appropriate subclasses for a belt or chain transmission, per se.

224.1 Belt tensioner affects brake operation:

This subclass is indented under subclass 224. Subject matter wherein the device to retard or stop rotation of the output load is influenced by a mechanism to adjust the tightness of the endless flexible band.

224.2 Belt failure operates brake:

This subclass is indented under subclass 224. Subject matter wherein the device to retard or stop rotation of the output load is applied in response to breakage of the endless flexible band or shifting of the band off of a gear or pulley.

224.3 Belt shipper affects brake operation:

This subclass is indented under subclass 224. Subject matter wherein the device to retard or stop rotation of the output load is applied in response to moving the endless flexible band from one pulley to another pulley.

225 Fluid operated:

This subclass is indented under subclass 215. Subject matter wherein the transmission or brake is operated by a hydraulic or pneumatic mechanism.

226 Electromagnetic:

This subclass is indented under subclass 215. Subject matter wherein the transmission or brake is operated by an electric or magnetic mechanism.

FOREIGN ART COLLECTIONS

The definition for FOR 100 below corresponds to the definition of the abolished subclasses under Class 192 from which these collections were formed. The definitions for FOR 101-FOR 103, FOR 106, FOR 107, and FOR 110-FOR 112 below correspond to the definitions of the abolished subclasses under Class 192 from which these collections were formed. See the Foreign Art Collections schedule for specific correspondences. [Note: The title and definitions for indented art collections include all the details of the one(s) that are hierarchically superior.]

FOR 100 Electric (192/84 R):

Devices for operating clutches by electric action.

FOR 101 TRANSMISSION CONTROL AND BRAKE (192/4 R):

Foreign art collection for combinations for joint operation and control of transmission and braking mechanisms.

FOR 102 Back-pedaling brake (192/5):

Foreign art collection for mechanism in which the brake is applied when the transmission is impelled in the reverse direction.

FOR 103 Hub brake (192/6 R):

Foreign art collection for mechanism in which the transmission and brake mechanisms act on the same member, called the "hub".

FOR 106 Automatic brake (192/7):

Foreign art collection for mechanism in which the action of the brake is more or less completely automatic.

FOR 107 Responsive to drive release (192/8/R):

Foreign art collection for mechanism in which the braking action occurs upon the failure of the driving mechanism.

FOR 110 Electric control (192/9):

Foreign art collection for mechanism in which either the transmission or brake, or both, are operated electrically.

FOR 111 Belt shipper (192/10):

Foreign art collection for mechanism in which the transmission element is a belt, the brake being applied upon the shifting of the belt.

FOR 112 Belt tightener (192/11):

Foreign art collection for mechanism in which the transmission element is a belt, the brake being applied upon the slackening of the driving-belt.

FOR 116 With adjustable means to move clutch-element axially (e.g., to compensate for wear):

Foreign art collection for device provided with means for moving a member along said axis and with means additional to the member-moving means, which additional means is capable of axially changing the positional relationship between one of the members

and a member mating therewith, such change being additional to the movement effected by the member-moving means.

- (1) Note. The structure described is for the purpose of offsetting the decrease in the axial dimension of the clutch-elements due to attrition of the surfaces of the elements that occurs as they are repeatedly engaged and disengaged under load.

FOR 117 Wear compensators:

Foreign art collections for devices under Elements including mechanism to compensate for wear in effecting the engagement of clutches.

FOR 143 Ball or Roller (192/45):

This foreign art collection is indented under unnumbered placeholder 192/41. Foreign art collection for clutches in which the engaging element is a ball or roller.

END