CLASSIFICATION ORDER 1873

NOVEMBER 6, 2007

PROJECT E-6547

The following classification changes will be effected by this order:

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass</th>
<th>Art Unit</th>
<th>Ex’r Search Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abolished:</td>
<td>318</td>
<td>138, 254, 439</td>
<td>2837</td>
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<td>Established:</td>
<td>318</td>
<td>254.1, 254.2, 400.01-400.09, 400.1, 400.11-400.19, 400.2, 400.21-400.29, 400.3, 400.31-400.39, 400.4, 400.41, 400.42</td>
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The following classes are also impacted by this order:
310, 327, 334, 388

This order includes the following:

A. CLASSIFICATION MANUAL CHANGES
B. LISTING OF PRINCIPAL SOURCE OF ESTABLISHED AND DISPOSITION OF ABOLISHED SUBCLASSES
C. CHANGES TO THE USPC-TO-IPC CONCORDANCE
D. DEFINITION CHANGES AND NEW OR ADDITIONAL DEFINITIONS
CLASSIFICATION ORDER 1873

NOVEMBER 6, 2007

PROJECT E-6547

Project Classifier(s): Dave Warren
Reviewer(s): Yen Nguyen
Editor(s): Almeta Quinn

Publications Specialist(s): Louise Bogans
ELECTRIC MOTOR WITH NONMOTOR DRIVING MEANS (E.G., AXLE DRIVE, MANUAL DRIVE)

Manual driving means

WITH PARTICULAR MOTOR-DRIVEN LOAD DEVICE

Plural, diverse or diversely controlled load device

Plural motor drive

Tension-maintaining type of control system

Plural, diverse or diversely controlled motors

Power- or motion-transmitting mechanism

Reversible drive mechanism

Gearing

Differential type

Motion-converting mechanism

Mechanical gearing

SUPPLIED OR CONTROLLED BY SPACE-TRANSMITTED ELECTROMAGNETIC OR ELECTROSTATIC ENERGY (E.G., BY RADIO)

PORTABLE-MOUNTED MOTOR AND/OR PORTABLE-MOUNTED ELECTRICAL SYSTEMS THEREFOR

POSITIONAL SERVO SYSTEMS (E.G., SERVOMECHANISMS)

Adaptive or optimizing systems including "bang-bang" servos

Time-sharing or multiplexing systems

With protective or reliability increasing features (e.g., "fail-safe" systems)

"Redundant" operating channels

Monitoring systems

Maneuver, force, or load-limiting systems

Program- or pattern-controlled systems

With program recording or composing means

Multifunction manipulator (i.e., Robot)

Mobile robot

With particular program teaching method

Manual lead through

With particular interpolation means

With particular sensing device

With multimode control (e.g., course-fine, position-force, etc.)

Including velocity control

With particular coordinate transformation means

With plural control systems (e.g., the interaction of plural processors to control the plural joints of a single robot)

Including end effector (e.g., gripping jaw, micromanipulator, etc.)

With particular compensation (e.g., gain, offset, etc.)

Including program modification

...With reliability enhancement means (e.g., monitoring, redundant circuits, etc.)

...Including display device

...Digital or numerical systems

...Contouring systems

...With "food-rate" control

...With "zero-offset" or tool radius correction

...With interpolating means

...Multiple axes point to point systems

...Multiple axes analog systems

...Nonmechanical line, seam or edge followers

...Optical or photoelectric line followers

...Cam or template followers

...Multiple pass systems

...Vehicular guidance systems with single axis control

...Radio-controlled

...Celestial navigation

...Landing systems

...Altitude or pitch control

...Roll control

...Yaw control

...Land vehicles

...Marine vehicles

...Submarine and torpedo systems

...Multiple mode systems

...With mode-engagement features (e.g., manual to automatic)

...Fine and coarse systems

...Separate fine and coarse motors

...Digital systems

...Multiple speed synchro systems

...Combined "on-off" and proportional control

...Slewng systems

...With a separate slewing motor

...Pulse-width modulated power input to motor (e.g., "duty cycle" systems)

...Digital or numerical systems

...Digital comparison

...Communating switch-type encoder

...Pulse-counting systems

...Analogue comparison

...Synchro or resolver (e.g., transmitter simulators)

...Frequency- or phase-modulated systems

...Frequency comparison

...Phase comparison

..."Reset" systems (P.I.)

...With rate (P. I. D.) (e.g., reset windup prevention)

...With stabilizing features (e.g., anti-hunting, damping)

...Electric braking near balance (e.g., dynamic)

...D.C. in A.C. windings

...Friction-braking near balance including magnetic or eddy current brakes
POSITIONAL SERVO SYSTEMS (E.G.,
SERVOMECHANISMS)
..With stabilizing features (e.g.,
anti-hunting, damping)
615
...By auxiliary feedback loop
616
...Rate feedback
617
...Variable rate feedback
618
...Tachometer feedback
619
...Variable gain bandwidth
620
...Nonlinear circuits
621
...Lead or lag networks
622
...A.C. networks
623
...Load stabilization (e.g., viscous,
magnetic or friction dampers)
624
...By deadband at null (e.g., threshold
circuits)
625
...Plural servomotors
626
...Limit or end-stop control
627
...Secto-scanning systems
628
..."Feedback" systems
629
...Unwanted harmonic or voltage component
elimination quadrature rejection
systems
630
...Antibacklash systems (e.g., with
unidirectional approach to balance)
631
...Antistatic friction features (e.g.,
"dither" voltage)
632
...With compensating features
633
..."Two-cycle error" compensation
634
...Temperature compensation
635
...With signal-, voltage-, or
current-limiting
636
..."Sampling" systems including
miscellaneous "sampled data" control
systems
637
...Analog computation
638
...With particular "error-detecting" means
639
...Plural, diverse conditions
640
...Photoelectric or optical-type
measuring instruments
641
...With particular temperature measuring
instrument
642
...With liquid level measuring
instruments
643
...With moisture content or wetness
measuring instruments
644
...With flow measuring instruments
645
...With fluid pressure measuring
instruments
646
...With force or weight measuring
instruments
647
...With magnetic field measuring
instruments
648
...With inertial, direction or
inclination measuring instrument
649
...Stable platforms
650
...With current, voltage or electrical
power measuring instruments
651
...With acceleration measuring
instruments
652
...With particular position measuring
instruments
653
...Magnetic transducers
654
...Synchro control
transmitter-transformer systems

...With synchro differential
655
...Differential transformer systems
656
...Linear differential transformer
657
..."E" type transformer
658
..."Microsyn" type
659
..."Inductosyn" systems
660
...Resolver systems
661
...Variable capacitor systems
662
...Potentiometer systems including
autotransformers and Wheatstone
bridges
663
...Minor arc seeking
664
...Continuous rotation, unlimited range
665
...Controlled tap and slidewire
666
...With a bridge in the feedback
circuit
667
...Recalibrating systems
668
...Standing wave
669
...Contact resistance
670
...With particular motor control system
responsive to the "actuating signal"
671
...Discontinuous or "on-off" control
672
...Seeking switch type
673
...Wheatstone bridge type
674
...One transmitter or controller element
follows another
675
...Transmitter or controller element
returned (e.g., force balance
systems)
676
...With particular servoamplifier
677
...Differential amplifier
678
...Diverse types of amplifiers in
different stage
679
...Magnetic servoamplifiers
680
...Solid-state servoamplifiers
681
...Rotating amplifier (e.g., "Ward
Leonard" control)
682
...With particular phase discriminator
683
...With particular modulator or detector
(e.g., choppers)
684
..."Step-by-step" motors in closed-loop
servos
685
...Reciprocating or oscillating motors
686
...Linear movement motors
687
...Shaded pole motors
688
...Torquing motors
689
...SELF-SYNCHRONOUS TYPE OF MOTOR
690
...With means to amplify transmitter
signals
691
...Having induction or "selsyn" type
transmitter
692
...Having impedance-type transmitter
693
...Having commutated dynamoelectric
machine transmitter
694
...Having commutating switch-type
transmitter
695
...OPEN-LOOP STEPPING MOTOR CONTROL SYSTEMS
PLURAL, DIVERSE OR DIVERSELY CONTROLLED
ELECTRIC MOTORS
34
35
...Motors with diverse motions (e.g.,
reciprocating and rotary motors)
PLURAL, DIVERSE OR DIVERSELY CONTROLLED
ELECTRIC MOTORS

Plural reciprocating or oscillating motors
Plural linear-movement motors
Work and feed motors (e.g., indexing)
Motor biased against rotation
Having electrical synchronizing interconnections
Between windings on auxiliary dynamo-electric machines
D.C. or A.C. commutator motors with slip rings
Between induction motor secondaries
Mechanically coupled in fixed ratio of movement
Motors having unlike operating characteristics
Synchronous and nonsynchronous motors
Mechanically coupled in torque opposition
Motors electrically connected in cascade or tandem
With means for effecting other motor interconnections
Plural, diverse motor controls for different motors
Slipping and/or racing control for electric motors
Plural, diverse motor controls
Motor-reversing
...With running-speed control
...And braking
...And acceleration control
Running-speed control
...And acceleration control
...And automatic starting and/or stopping and/or with time delay
...Braking
...Acceleration control
Motor-reversing
Running-speed control
Diverse speeds for different motors
Relative motor speed control
...With speed-difference detector
...Electrical-type detectors
......Voltage and/or current difference detector
......Dynamoelectric machine detector
...Synchronously operated impedance detectors
...Synchronously actuated switch detectors
Plural switches connected in series
...Differential-gearing detector
...Controlling motor speed in response to speed of another motor
...Controlling A.C. frequency or rate of electrical impulses to other motor
...Control of both armature (or primary) and field (or secondary) circuits

Synchronous and nonsynchronous motors
Mechanically coupled in torque opposition
Motors electrically connected in cascade or tandem
With means for effecting other motor interconnections
Plural, diverse or diversely controlled sources of armature (or primary) supply
...Diverse sources
...A.C. and D.C.
...Different voltages
...Different voltages
...Different frequencies
...Series-parallel connected motors
...Parallel connected motors
...Series connected motors
IMPACT, MECHANICAL SHOCK, OR VIBRATION-PRODUCING MOTORS
MOTOR WITH DIVERSE MOTIONS [E.G., ROTARY AND RECIPROCATING] NONMAGNETIC MOTOR
Thermoelectric motor
MAGNETOSTRICTIVE MOTOR
RECIPROCATING OR OSCILLATING MOTOR
Stopping after predetermined number of reciprocations or cycles (including single cycle)
Having means to produce a progressing or traveling motor field flux
Plural, diverse or diversely controlled motor windings
RECIPIROCATING OR OSCILLATING MOTOR
- Plural, diverse or diversely controlled motor windings
- Polyphase or diverse or diversely controlled sources of motor supply
- A.C. and D.C. sources
- Unidirectionally conductive devices in energizing circuit
- Energizing winding circuit control
- Automatic in response to predetermined position, movement or condition in or of the motor or driven device
- Noise, sound, vibration, movement or position of motor
- By means for producing periodic electrical pulses in the energizing circuit
- Electrical oscillation or condenser charging and/or discharging circuits
- Motor or escapement-controlled means
- By space-discharge or unidirectionally conductive devices in energizing circuit
- By impedance devices in energizing circuit
- By circuit making and/or braking devices

LINEAR-MOVEMENT MOTORS
- Auxiliary means for producing mechanical starting or accelerating torque
- By auxiliary motor
- Battery-fed motor systems
- Generator-fed motor systems having generator control
- Automatic generator control and/or with time-delay means
- Responsive to diverse conditions or with time-delay means
- Plural electrical conditions
- Armature or primary current of motor
- Terminal voltage or counter e.m.f. of motor
- Speed of motor or driven device
- Speed or frequency of generator or its drive means
- Alternating-current-motor system
- With plural, diverse or diversely controlled generators
- With flywheel on generator or on motor
- Control of both the generator and the circuit to the motor
- With motor control
- Control of both the generator and the motor
- Control of excitation (field) circuit of both
- Plural, diverse or diversely actuated, generator control means
- Generator speed control
- Generator field circuit control
- Having motor element biased against rotation
- By resilient biasing means (e.g., spring)

WITH FLYWHEEL OR MASSIVE ROTARY MEMBER

CLASS 318 ELECTRICITY: MOTIVE POWER SYSTEMS

162 CONTROL BY PATTERNS OR OTHER PREDETERMINED SCHEDULE MEANS
- Motor running-speed control
- Cyclically varying or repeated speed schedules

SYNCHRONOUS MOTOR SYSTEMS
- Brushless motor closed-loop control
- Vector control (e.g., dq-axis control, 3-2 phase conversion, etc.)
- Plural reference comparison (e.g., reference changes during startup, upper/lower reference, etc.)
- Specific processing of feedback signal or circuit therefore (i.e., A-D conversion, compression, or modification)
- With reference signal generation (e.g., from external system, mechanical oscillator, etc.)
- Comparator circuit or method
- Plural diverse feedback (e.g., torque and speed, load and speed, etc.)
- With nonmotor parameter or remote condition detected (e.g., temperature, light, airflow, position of diverse object, etc.)
- Plural mode control (e.g., open and closed loop, starting and braking, plural-phase and single-phase operation, open and closed loop, etc.)
- With timing or delay
- With separate starting mode or "ramp-up" mode (e.g., open-loop control for startup, startup initialization, etc.)
- With table lookup, stored map, or memory table (e.g., speed table, stored current profile, etc.)
- Phase shifted as function of speed or position
- With torque or load determination (e.g., by calculation, detection, or estimation, etc.)
- Control or position information digitally stored on disk (e.g., computer hard drive position detection, etc.)
- Modification or waveshaping of switching control signal (e.g., switching control input to inverter, etc.)
- With manual control (e.g., foot switch, surgical tool, etc.)
- Slow rate control (e.g., slow limiting, etc.)

* Newly Established Subclass
@ Position Change
& Title Change
SYNCHRONOUS MOTOR SYSTEMS

* Brushless motor closed-loop control

400.2 Phase voltage wave-shaping circuit or method (e.g., output from inverter, phase energizing signal, trapezoidal wave, etc.)

400.21 Having protection means (e.g., switching circuit protection, stall protection, failure to start, "wrong" direction, etc.)

400.22 Current or voltage limiting (e.g., over-voltage or over-current protection, etc.)

400.23 Torque ripple stabilization or acoustic noise attenuation (e.g., cogging prevention, etc.)

400.24 Electrical noise attenuation (e.g., EMI, EMP, BFI, etc.)

400.25 Switching noise transient attenuation (e.g., switching error prevention, masking, blanking, etc.)

400.26 Switching circuit structure or component (e.g., inverter, bridge circuit, etc.)

400.27 Having both high-side and low-side switching elements for plural-phase motor

400.28 Diverse high side or low side switching

400.29 H-bridge

400.3 Power supply voltage feature (e.g., power supply voltage, Vcc compensation, rectifier circuit, power regulator, auxiliary or secondary power supply, etc.)

400.31 Utilization or dissipation of stored or collapsing field energy (e.g., fressing, discharging one winding through another, etc.)

400.32 Sensorless feedback circuit

400.33 Voltage injection detection (e.g., voltage injected at startup to determine position, etc.)

400.34 Electromotive force sensor (e.g., back or counter EMF sensor, etc.)

400.35 With zero-crossing detection (e.g., polarity reversal, etc.)

400.36 With center-tap feedback circuit

400.37 With sensor structure (e.g., tachometer, speed switch, cam-controlled switching, etc.)

400.38 Magnetic field sensor or responsive device (e.g., Hall element, magnetoresistance, etc.)

400.39 Rotating sensor component separate from motor structure (e.g., resolver, magnetically sensed rotating disk, etc.)

400.4 Optical sensor (e.g., encoder, photodetector, etc.)

400.41 Having specific motor structure (e.g., bifilar windings, airgap dimension, auxiliary winding, phase winding with midtap, etc.)

400.42 Brushless motor open-loop control

* Title Change

701 Hysteretic or reluctance motor systems

702 Antihunting or damping

703 Braking

* Newly Established Subclass
INDUCTION MOTOR SYSTEMS

1. Reversing
   a. With diverse motor operation
   b. With braking
   c. Electromagnetic brakes
2. Generator action
3. Plugging
4. With controlled saturable reactor in primary circuit
5. Two phase motor
6. With plural primary windings or winding portions having common connection
7. Operating from a single phase source
8. Shaded pole motor
9. Split phase motor with capacitor interchangeably connected in series with either primary winding
10. With controlled electronic device to provide the series connection
11. With de-energizable start winding
12. With separate winding or winding portion energized for each direction of rotation
13. Automatic current reversal on start winding
14. With controlled electronic switch for phase reversal
15. Braking
16. With diverse operation
17. Dynamic braking
18. Direct current primary winding braking circuit
19. Rotating rotor controls braking current in primary winding
20. With a.c. to d.c. conversion circuit
21. Reversal of power to primary winding
22. Three phase power reversal
23. Eddy current braking circuits
24. Primary and secondary circuits
25. Primary circuit control
26. Three phase motor operated from single phase source
27. With dynamic electric converter
28. Dual voltage motors
29. Delta-wye, plural wye, or plural delta connected primary windings
30. Plural speed
31. Pole changing
32. Single phase motor
33. Separate primary running winding for each pole number, alternately energized
34. Entire primary running winding energized for each running speed
35. Separate primary running winding for each pole number, alternately energized
36. Starting control
37. With speed control
38. Three phase motor with variable transformer to initially adjust voltage to motor windings
39. Operating from a single phase source

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Thermal starting and thermal overload protection
Impedance for reducing current during starting operation
Start winding removed during running operation
By electronic switch
By transformer for sensing the run winding current
With variable temperature coefficient resistor in switch control circuit
By electromagnetic switch
With relay coil in series with main winding
By thermal switch
With variable temperature coefficient impedance element
By centrifugal switch
Capacitor run motor with different capacitance at starting
With plural capacitors
Saturable winding in capacitor run motor circuit
Phase splitting using stator winding mutual inductance or saturable winding
Responsive to motor condition
Responsive to speed or rotation phase angle
With controlled power conversion
Including inverter
Responsive to an additional condition
With controlled a.c. to d.c. circuit in inverter supply
With controlled magnetic reactance
Responsive to motor voltage
Condition responsive
Frequency control
With voltage magnitude control
With voltage phase angle control
With voltage pulse time control
Phase width modulation or chopping
Voltage control
With transformer
With impedance control
Saturable reactor
Single phase, split phase motors
With capacitor
Secondary circuit control
Open secondary member or portion thereof with means to open or close the circuit thereto
Closed secondary member or member portion with means to change electrical characteristics thereof
Impedance control of secondary circuit

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# Title Change
* Newly Established Subclass
INDUCTION MOTOR SYSTEMS

Secondary circuit control

Responsive control of secondary circuit

Secondary circuit impedance

Induction motor current

Primary motor current

Frequency of secondary current

Secondary voltage

By manual operation

With relatively movable cooperating motor parts to control energized motor

Axially movable cooperating parts

Dual stators, one or both angularly movable

ALTERNATING CURRENT COMMUTATING MOTORS

Universal or A.C.-D.C. motors

SERIES MOTORS

Convertible for nonseries motor operation

With plural, diverse or diversely connected or controlled sources of e.m.f.

Control by motor circuit impedance

Impedance in series with field windings and in parallel to armature winding

Field circuit control

Plural, diverse or diversely connected or controlled field coils

HOMOPOLAR OR UNIFORM FIELD MOTORS

SWITCHED RELUCTANCE MOTOR COMMUTATION CONTROL

* 254.1 Having asymmetric half-bridge

PLURAL DIVERSE MOTOR CONTROLS

Motor-reversing

With running-speed control

And braking

And acceleration control

With acceleration control

And acceleration control

With acceleration control

With automatic starting and/or stopping

Stopping upon predetermined movement of or position of motor or driven device

At limit-of-travel of motor or driven device

Dual control circuits alternately energized

Running-speed control

With braking

And acceleration control

With acceleration control

With automatic starting and/or stopping

Motor braking

With acceleration control

With automatic starting and/or stopping

Acceleration control

With automatic starting and/or stopping

In response to an electrical condition

Automatic stopping means less responsive during acceleration

PERIODIC- OR INTERMITTENT-REVERSING

In response to movement or position (e.g., limit of travel) of motor or driven device

Automatic and/or with time-delay means

With means to delay reversing until motor substantially stops

Instant of, or passage or predetermined time or having time-delay means

Movement or position of motor or driven device

Armature or primary circuit control

Plural, diverse or diversely controlled armature windings

Phase-reversal

Selectively energized windings

Armature or primary current reversal

By shifting motor brushes or selecting appropriate set of brushes

Reversing polarity of current supplied to armature circuit

Wheatstone bridge type

Potentiometer-controlled

Field circuit control

Plural, diverse or diversely controlled field windings

Simultaneous energization

With means for short-circuiting a winding

Field-circuit current reversed

Class 388 subclasses 800-841 are an integral part of this Class (Class 318), as shown by the position of this box, and follows the schedule hierarchy of this Class, retaining all pertinent definitions and Class lines of this class.

BRACING

"Spotting" or adjustment of braking controller during coasting

Automatic and/or with time-delay means

Condition of motor or driven device

Motor or primary circuit voltage or terminal or counter e.m.f. voltage

Speed, acceleration, movement or position of motor or driven device

Plural, diverse or diversely controlled braking means

Title Change

Newly Established Subclass

Indent Change

Position Change
318-8

**CLASS 318 ELECTRICITY: MOTIVE POWER SYSTEMS**

**BRAKING**
- Plural, diverse or diversely controlled braking means
- Including both friction braking and/or dynamic braking

**FRICTION BRAKING**
- "Plugging" or application of reverse power to motor
- Energy flow interrupted when motor stops

**DYNAMIC BRAKING**
- Regenerative
  - With additional source of e.m.f.
  - In series with armature or primary circuit
- Locally closed armature circuit
- Closed through impedance or the like
- With field or secondary circuit control
- By auxiliary electric generator or by magnetic attraction or repulsion devices

**"ANTI-BRAKING" OR BRAKING-PREVENTION MEANS**

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**NOVEMBER 2007**

Class 388 subclasses 842-860 are an integral part of this Class (Class 318), as shown by the position of this box, and follows the schedule hierarchy of this Class, retaining all pertinent definitions and Class lines of this class.

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**MOTOR LOAD, ARMATURE CURRENT OR FORCE CONTROL DURING STARTING AND/OR STOPPING**
- Initial, "cracking" or "starting from rest" torque control

**CONSTANT MOTOR CURRENT, LOAD AND/OR TORQUE CONTROL**
- Control of motor load or device driven

**LIMITATION OF MOTOR LOAD, CURRENT, TORQUE OR FORCE (E.G., PREVENTING OVERLOAD)**
- Overloading limit-of-travel-type control means

**NONRUNNING, ENERGIZED MOTOR**
- Phasing or angular or linear positional control of movable element of the motor

**POWER FACTOR CONTROL OF ARMATURE OR LINE CIRCUIT**
- Having plural, diverse or diversely controlled sources
- A.C. and D.C.
- Different voltages

**PERIODIC, REPETITIOUS OR SUCCESSIVE OPERATIONS CONTROL OF MOTOR, INCLUDING "JOG" AND "INCH" CONTROL**
- Variable periods or intervals between controlling operations

**AUTOMATIC AND/OR WITH TIME-DELAY MEANS (E.G., AUTOMATIC STARTING AND/OR STOPPING)**
- With nonautomatic control means (e.g., manual)
- Nonresponsive or less responsive for limited periods
- Anti-hunting
- With respect to a fixed standard, master or reference device

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0 Indent Change
& Position Change
CONTROL OF BOTH MOTOR CIRCUIT AND MOTOR STRUCTURE

MOTOR MAGNETIC ENERGY DISSIPATION

CONTROL OF BOTH ARMATURE (OR PRIMARY) CIRCUIT AND FIELD (OR SECONDARY) CIRCUIT

ARMATURE (OR PRIMARY) CIRCUIT CONTROL

Plural, diverse or diversely controlled, armature or primary windings

Polyphase windings

Series-parallel

Energized or controlled in predetermiined sequence

Wound or energized in magnetic opposition

Plural sources of voltage (including counter e.m.f. cells)

By shunting armature or primary winding

Variable length or tapped armature winding

Frequency or pulsation control

Voltage control

By means to space-discharge devices

Plural, diverse or diversely connected or controlled space-discharge devices

Having discharge-control means (e.g., grids)

Impedance-controlled

Plural, diverse or diversely controlled impedances

Including both reactor and condenser

Inherently or self-variable impedance

Inductive reactor controlled

Having auxiliary means for saturating reactor core

Resistor-controlled

Having short-circuiting means

Short-circuited step-by-step

By armature or primary circuit-making and/or breaking

Electromagnetically actuated

FIELD OR SECONDARY CIRCUIT CONTROL

Plural, diverse or diversely connected or controlled field windings

Convertible number-of-poles type (e.g., 4-pole or 6-pole)

Differentially wound or energized windings

Series-parallel

Series field winding

With means to short circuit a field winding

Selectively energized

Plural, diverse or diversely connected or controlled sources of field circuit voltage

Variable length or tapped field winding

By means of space-discharge device in field circuit

Impedance-controlled

Plural, diverse or diversely connected or controlled field circuit impedances

...Wheatstone bridge

By field circuit making and/or breaking

Intermittently operated

MOTOR STRUCTURE ADJUSTMENT OR CONTROL

Both armature and field structures rotatable or adjustable

Rotor element movable axially

Brush or other current-collector control

Having movement toward or from cooperating part (e.g., brush lifted from commutator)

THREE-OR-MORE-POSITIONS MOTOR CONTROLLER SYSTEMS

With other motor control device

Main line switch

Plural, diverse or diversely controlled controllers

Plural control stations

Plural control stations

Return to "off", "starting" or "neutral" positions

Power-operated controllers

Knee- or foot-operated controllers

Power-actuated controllers

Separately actuated controller contacts

Electromagnetic actuated

Electromagnetic actuated

Reciprocating or oscillating electromagnetic means

Intermittent or step-by-step operation

MISCELLANEOUS

FOREIGN ART COLLECTIONS

FOREIGN PATENTS OR NONPATENT LITERATURE

Any foreign patents or nonpatent literature from subclasses that have been reclassified have been transferred directly to the FOR Collections listed below. These Collections contain ONLY foreign patents or nonpatent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

* FOR 100 SPACE-DISCHARGE-DEVICE COMMUTATI...
<table>
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<th>Number of ORs</th>
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**NOVEMBER 6, 2007**

**PROJECT E-6547**

**DISPOSITION CLASSIFICATION(S) OF PATENTS FROM ABOLISHED SUBCLASSES REPORT**

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**DISPOSITION CLASSIFICATION(S) OF PATENTS FROM ABOLISHED SUBCLASSES REPORT**

Generated by Data Control Division

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C.  CHANGES TO THE USPC-TO-IPC CONCORDANCE

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C. CHANGES TO THE USPC-TO-IPC CONCORDANCE

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D.  CHANGES TO THE DEFINITIONS

CLASS 310 - ELECTRICAL GENERATOR OR MOTOR STRUCTURE

Definitions Modified

Subclass 220: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.1-400.42 for electric motor systems having means to control the commutation.
D. CHANGES TO THE DEFINITIONS

CLASS 318 - ELECTRICITY: MOTIVE POWER SYSTEMS

Definitions Abolished

Subclasses
138, 254, 439

Definitions Modified

Subclass 244: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The reference to subclass 138

Insert:

400.1, through 400.42, for synchronous motor commutation control systems.

Subclass 494: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The references to subclasses 138, 254, and 439

Insert:

254.1, and 254.2, for this subject matter where the motor is a self-commutated impulse or reluctance motor.

400.1, through 400.42, for motor commutation control systems.

Subclass 505: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The reference to subclass 138
D. CHANGES TO THE DEFINITIONS

Insert:

400.1, through 400.42, for synchronous motor commutation control systems.

Subclass 696: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The reference to subclass 138

Insert:

400.42, for open-loop commutated motors.

Subclass 700: In the (2) Note, after “appropriate subclass.”

Delete:

See subclass 254.

Subclass 700: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The reference to subclass 254

Insert:

254.1, and 254.2, see (2) Note above.

Subclass 701: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The reference to subclass 254
D. CHANGES TO THE DEFINITIONS

Insert:

254.1, and 254.2, for motor systems having a self-commutated motor in which the rotor tends to assume positions of minimum magnetic reluctance when energized.

Subclass 722: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The reference to subclass 138

Insert:

400.1, through 400.42, for synchronous motor commutation control systems.

Subclass 738: Under SEE OR SEARCH THIS CLASS, SUBCLASS

Delete:

The references to subclasses 138 and 439

Insert:

400.1, through 400.42, for synchronous motor commutation control systems.

Definitions Established

254.1 SWITCHED RELUCTANCE MOTOR COMMUTATION CONTROL:
Subject matter under the class definition in which the rotor element tends to assume a predetermined angular position when the motor is continuously energized and is provided with a commutator or circuit making and breaking device which is actuated by the motor to determine the instants of time at which the field producing windings thereof are energized and de-energized relative to the angular position of the rotary element.

(1) Note. In a switched reluctance motor, there are no permanent magnets and no windings on the rotor and the rotor assumes a position to minimize reluctance. Therefore, these motors are capable of high speeds, but produce little torque.

(2) Note. Typically, three-phase switched reluctance motors are in a 6/4 form, that is six stator and four rotor poles.
D. CHANGES TO THE DEFINITIONS

SEE OR SEARCH THIS CLASS, SUBCLASS:
701, for reluctance synchronous motors.

254.2 Having asymmetric half-bridge:
Subject matter under subclass 254.1 wherein the circuit making or breaking means includes a bridge circuit wherein each side of the bridge contains both a transistor (or switch) and a diode and the motor is connected between the transistor and the diode.

Figure 1. Typical circuit configurations.

SEE OR SEARCH THIS CLASS, SUBCLASS:
701, for reluctance synchronous motors.

400.01 Brushless motor closed-loop control:
Subject matter under subclass 700 for controlling the currents or voltages in (or supplied to) the motor phases (or windings) to control motor performance (or produce torque) without motor-controlled mechanical switches (i.e., commutators, brushes, slip rings, etc.) by generating a feedback signal in response to any motor parameter (e.g., speed, position, load, torque, current, voltage, acceleration, etc.) and controlling the motor in response to the feedback signal.

(1) Note. Brushless motors are often called “self-commutating” motors.
D. CHANGES TO THE DEFINITIONS

(2) Note. This subclass may also include subject matter wherein the motor is controlled by an additional or remote parameter signal (e.g., light, temperature, fluid flow, position of a work piece, etc.). However, in this case, the motor is also controlled by a feedback signal in response to any motor parameter (e.g., speed, position, torque, load, current, voltage, acceleration, etc.).

SEE OR SEARCH CLASS:

388, Electricity: Motor Control Systems, subclasses 800-824 for closed-loop speed control of motors having commutators and subclasses 842-847 for closed-loop acceleration control of motors having commutators.

400.02 Vector control (e.g., dq-axis control, 3-2 phase conversion, etc.):
Subject matter under subclass 400.01 in which the feedback loop includes a means to convert multiphase currents or voltages supplied to the motor phases (or windings) to a two-phase representation of a related motor parameter (e.g., flux, rotor angle current vector, etc.) which is used to control the motor.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 151 for miscellaneous electrical conversion systems.

341, Coded Data Generation or Conversion, appropriate subclasses for conversion of data, per se.

363, Electric Power Conversion Systems, subclasses 1-12 for frequency and phase converters and subclass 150 for phase conversion using dynamoelectric machines.

400.03 Plural reference comparison (e.g., reference changes during startup, upper/lower reference, etc.):
Subject matter under subclass 400.01 in which the feedback signal is compared against more than one reference value.

400.04 Specific processing of feedback signal or circuit therefore (i.e., A-D conversion, compression, or modification):
Subject matter under subclass 400.01 in which the feedback signal is altered, modified, or converted.

(1) Note. This subclass does not include nominally recited feedback circuits or processes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

615, for auxiliary feedback loops in a servomotor control circuit.
D. CHANGES TO THE DEFINITIONS

667, for a bridge feedback circuit.

SEE OR SEARCH CLASS:
73, Measuring and Testing, for measuring (or sensing) nonelectrical parameters.
361, Electricity: Electrical Systems and Devices, subclasses 236-244 for speed measurements and signal processing thereof.
388, Electricity: Motor Control Systems, subclasses 923-934 for specific feedback circuits for motors having commutators.

400.05 With reference signal generation (e.g., from external system, mechanical oscillator, etc.):
Subject matter under subclass 400.04 comprising a circuit or method for obtaining or generating a parameter or value (i.e., the reference signal) by which a feedback signal can be compared.

SEE OR SEARCH THIS CLASS, SUBCLASS:
449, for automatic motor control with respect to a fixed standard.
451, for motor control via a mechanical reference, such as a tuning fork.

400.06 Comparator circuit or method:
Subject matter under subclass 400.04 comprising a circuit or technique by which to compare the motor feedback signal with a reference or value.

SEE OR SEARCH THIS CLASS, SUBCLASS:
601, for digital comparison techniques in servo systems.
607, and 608, for frequency and phase comparison techniques in servo systems.

400.07 Plural diverse feedback (e.g., torque and speed, load and speed, etc.):
Subject matter under subclass 400.04 wherein two or more motor conditions or parameters are detected and used as feedback signals.

(1) Note. The use of plural feedback circuits measuring the same parameter does not qualify to be included in this subclass (e.g., speed measurement for each phase of a three-phase motor).
D. CHANGES TO THE DEFINITIONS

SEE OR SEARCH THIS CLASS, SUBCLASS:

601, for digital comparison techniques in servo systems.

607, and 608, for frequency and phase comparison techniques in servo systems.

400.08 With nonmotor parameter or remote condition detected (e.g., temperature, light, airflow, position of diverse object, etc.):
Subject matter under subclass 400.04 in which the control signal is a function of a condition spatially separate from the motor structure.

(1) Note. In the case of light sensing, this subclass does not include subject matter where optical means are used to sense rotor position for feedback to the commutation control circuit.

(2) Note. The motor shaft is a part of the motor structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

400.4, for light sensing of rotor position.

471, for automatic motor control via thermal conditions.

638, through 670, for “error” detecting means, especially subclass 641 for temperature, subclass 643 for moisture, and subclass 644 for flow.

SEE OR SEARCH CLASS:

73, Measuring and Testing, for measuring (or sensing) nonelectrical parameters.

324, Electricity: Measuring and Testing, for measuring (or sensing) electrical parameters.

400.09 Plural mode control (e.g., open and closed loop, starting and braking, plural-phase and single-phase operation, open and closed loop, etc.):
Subject matter under subclass 400.01 in which the motor is controlled in more than one distinct set or range of operational characteristics (e.g., high/low speed, forward/reverse, running/braking, high/low torque, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

255, through 279, for plural motor control systems.

362, through 382, for motor braking systems.
D. CHANGES TO THE DEFINITIONS

590, through 598, for multiple mode servo systems.

400.1 With timing or delay:
Subject matter under subclass 400.09 in which a second mode of operation is initiated after a specified period of time.

SEE OR SEARCH THIS CLASS, SUBCLASS:
445, through 489, for automatic motor control with a time-delay means (e.g., automatic starting or stopping).

400.11 With separate starting mode or “ramp-up” mode (e.g., open-loop control for startup, startup initialization, etc.):
Subject matter subclass 400.09 wherein the motor is controlled with one distinct set or range of operational characteristics prior to reaching running speed and a second set or range of operational characteristics at running speed.

(1) Note. Running speed is any speed for which the motor was designed to operate. A separate starting mode may, for example, be used to quickly establish a speed (by supplying more torque), prevent over-current situations (when starting from standstill), or to establish a set of starting parameters (e.g., position, etc.).

400.12 With table lookup, stored map, or memory table (e.g., speed table, stored current profile, etc.):
Subject matter under subclass 400.09 wherein the control information for each of the plural modes is predetermined and stored in a table, map, or memory.

SEE OR SEARCH THIS CLASS, SUBCLASS:
567, for program- or pattern-controlled servo systems.

400.13 With timing, delay, or clock pulse counting circuit or generation:
Subject matter under subclass 400.01 wherein a means by which a temporal assessment is used within the feedback system to provide control.

SEE OR SEARCH THIS CLASS, SUBCLASS:
445, through 489, for automatic motor control with a time-delay means (e.g., automatic starting or stopping).

484, for time-delay means in automatic motor control systems.

400.14 Phase shifted as function of speed or position:
Subject matter under subclass 400.13 wherein the currents or voltages to the motor phases or windings are advanced and/or made to lag in accordance with detected speed and/or position.
D. CHANGES TO THE DEFINITIONS

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, appropriate subclasses for the miscellaneous systems for controlling phase angle or voltage and/or current magnitude, and for the miscellaneous transformer and impedance systems.

400.15 With torque or load determination (e.g., by calculation, detection, or estimation, etc.):
Subject matter under subclass 400.01 wherein the rotational force of the motor or resistance to rotation is determined by calculation, estimation, or detection.

400.16 Control or position information digitally stored on disk (e.g., computer hard drive position detection, etc.):
Subject matter under subclass 400.01 wherein information concerning the position or control of the motor is digitally stored on a computer disk (e.g., a hard drive).

(1) Note. This subclass does not include disk control systems, per se.

SEE OR SEARCH CLASS:

720, Dynamic Optical Information Storage or Retrieval, for optical disks, per se.

400.17 Modification or waveshaping of switching control signal (e.g., switching control input to inverter, etc.):
Subject matter under subclass 400.01 in which switching control signals used to control motor performance (or produce torque) are processed, modified, manipulated, or generated.

(1) Note. Typically, these “switching control signals” are used to control the inverter switches. This subclass does not pertain to the currents or voltages sent to the motor windings, but instead pertains to the signals that control or cause the currents or voltages to be sent to the motor windings.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 106 for waveform determinative or pulse-producing systems.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 100-333 for signal or waveform converting, shaping, or generating.

388, Electricity: Motor Control Systems, subclass 915 for waveform generators used to control motors with commutators.

400.18 With manual control (e.g., foot switch, surgical tool, etc.):
Subject matter under subclass 400.01 wherein a human operator provides motor control via an interface.
D. CHANGES TO THE DEFINITIONS

SEE OR SEARCH THIS CLASS, SUBCLASS:

551, for foot- or knee-controlled motor systems.

400.19 Slew rate control (e.g., slew limiting, etc.):
Subject matter under subclass 400.01 wherein the time rate of change (or gradient) of voltage or current in either the phase windings or in a circuit for controlling the voltages or currents is varied or regulated.

(1) Note. Slew rate control is often employed to prevent switching transients, electromagnetic interference, and noise.

400.2 Phase voltage wave-shaping circuit or method (e.g., output from inverter, phase energizing signal, trapezoidal wave, etc.):
Subject matter under subclass 400.01 in which the energy supplied to the motor field windings is modified and/or altered to achieve a desired result (e.g., wave shaping the drive pulses).

SEE OR SEARCH THIS CLASS, SUBCLASS:

43, for inverter input waveshaping (i.e., waveshaping circuits for driving the inverter).

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 106 for waveform determinative or pulse-producing systems.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 100-333 for signal or waveform converting, shaping, or generating.

388, Electricity: Motor Control Systems, subclass 915 for waveform generators used to control motors with commutators.

400.21 Having protection means (e.g., switching circuit protection, stall protection, failure to start, “wrong” direction, etc.):
Subject matter under subclass 400.01 in which any part of the motor, switches, feedback system, and/or commutation control hardware is protected against adverse effects.

SEE OR SEARCH THIS CLASS, SUBCLASS:

563, through 566, for servo systems having protective features.

706, and 707, for motor synchronization systems wherein failure to synchronize is determined.
D. CHANGES TO THE DEFINITIONS

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 1-138 for safety and protection of systems and devices.

400.22 Current or voltage limiting (e.g., over-voltage or over-current protection, etc.):
Subject matter under subclass 400.21 in which current and/or voltage is limited, reduced, or compensated to prevent failure or malfunction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
635, for current or voltage limiting in servomotors.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 1-138 for safety and protection of systems and devices, especially subclass 93.9 for current limiting.

400.23 Torque ripple stabilization or acoustic noise attenuation (e.g., cogging prevention, etc.):
Subject matter under subclass 400.01 in which the sound or mechanical vibration of the motor is attenuated or eliminated (or otherwise modified) and/or the motor torque is stabilized and variations are reduced.

SEE OR SEARCH THIS CLASS, SUBCLASS:
128, for controlling motor in response to noise, sound, vibration, or position of a motor.

400.24 Electrical noise attenuation (e.g., EMI, EMR, RFI, etc.):
Subject matter under subclass 400.01 for reducing or eliminating electromagnetic radiation or electrical disturbances (e.g., transients or perturbations) which interfere with desired operation (e.g., feedback signal) of the motor.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclass 19.4 for noise-preventing switching.

361, Electricity: Electrical Systems and Devices, subclass 800 for shielding structures.
D. CHANGES TO THE DEFINITIONS

400.25 **Switching noise transient attenuation (e.g., switching error prevention, masking, blanking, etc.):** Subject matter under subclass 400.24 in which the electrical disturbances or transients that result from transistor (i.e., in the inverter) switching during motor control are reduced or eliminated.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclass 19.4 for noise-preventing switching.

361, Electricity: Electrical Systems and Devices, subclass 800 for shielding structures.

400.26 **Switching circuit structure or component (e.g., inverter, bridge circuit, etc.):** Subject matter under subclass 400.01 directed to circuits to make or break (i.e., switches) the electrical power to the windings.

(1) Note. This subclass includes single-phase inverters.

(2) Note. This subclass also includes the rectifier circuit commonly associated with inverter circuits to rectify an ac source to dc for use by the inverter switches.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, for switches, per se.

363, Electric Power Conversion Systems, subclasses 135-139 for inverter systems (e.g., having thyristor).

400.27 **Having both high-side and low-side switching elements for plural-phase motor:** Subject matter under subclass 400.26 having a means to connect and disconnect a motor winding to a power supply (i.e., the high-side switching elements) and to connect and disconnect a motor winding to ground (i.e., the low-side switching elements).
Figure 1. T1a, T2a, and T3a are high-side switching elements; T1b, T2b, and T3b are low-side switching elements; and A, B, and C indicate connections to the motor windings.

SEE OR SEARCH CLASS:
363, Electric Power Conversion Systems, subclasses 135-139 for inverter systems (e.g., having thyristor).

400.28 Diverse high side or low side switching:
Subject matter under subclass 400.27 wherein the means to connect and disconnect a motor winding to a power supply (i.e., the high-side switching elements) and the means to connect and disconnect a motor winding to ground (i.e., the low-side switching elements) are controlled in a different manner or by a different method.

SEE OR SEARCH CLASS:
363, Electric Power Conversion Systems, subclasses 135-139 for inverter systems (e.g., having thyristor).

400.29 H-bridge type:
Subject matter under subclass 400.26 in which the motor is connected between two switches for connecting the motor to a voltage supply (high-side switching elements) and two switches for connecting the motor to ground (low-side switching elements).
D. CHANGES TO THE DEFINITIONS

Figure 1. S1 and S3 are high-side switching elements; and S2 and S4 are low-side switching elements.

400.3 Power supply voltage feature (e.g., power supply voltage, Vcc compensation, rectifier circuit, power regulator, auxiliary or secondary power supply, etc.):
Subject matter under subclass 400.01 pertaining to the supply of voltage or current to a circuit for controlling the motor.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 149-157 for miscellaneous “power pack” systems.

315, Electric Lamp and Discharge Devices: Systems, subclasses 91-93 for cathode or cathode heater including anode supply circuit but not including any grid-biasing circuit.

323, Electricity: Power Supply or Regulation Systems, appropriate subclasses for the miscellaneous systems for controlling phase angle or voltage and/or current magnitude, and for the miscellaneous transformer and impedance systems.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 530-550 for miscellaneous circuits combined with power supply or bias means.

363, Electric Power Conversion Systems, appropriate subclasses for inverter and/or converter systems.

400.31 Utilization or dissipation of stored or collapsing field energy (e.g., freewheeling, discharging one winding through another, etc.):
Subject matter under subclass 400.01 wherein energy stored in a motor winding is controlled, modified, dissipated, or used.
D. CHANGES TO THE DEFINITIONS

400.32 Sensorless feedback circuit:
Subject matter under subclass 400.01 in which motor parameters (e.g., rotor position, speed, etc.) are determined by measuring phase current or voltage.

(1) Note. While phase currents and voltages are “sensed,” per se, sensors typically refer to physical units attached to the motor (or rotor) (e.g., Hall effect sensors, tachometers, etc.). Therefore, sensorless motors are those without the physical unit attached to the motor (or rotor).

SEE OR SEARCH THIS CLASS, SUBCLASS:
615, for auxiliary feedback loops in a servomotor control circuit.

667, for a bridge feedback circuit.

SEE OR SEARCH CLASS:
73, Measuring and Testing, for measuring (or sensing) nonelectrical parameters.


361, Electricity: Electrical Systems and Devices, subclasses 236-244 for speed measurements and signal processing thereof.

388, Electricity: Motor Control Systems, subclasses 923-934 for specific feedback circuits for motors having commutators.

400.33 Voltage injection detection (e.g., voltage injected at startup to determine position, etc.):
Subject matter under subclass 400.32 wherein a usually small or test voltage (typically not large enough to generate torque) is applied to (i.e., “injected”) the motor winding to determine position.

(1) Note. This is typically done to determine motor position prior at startup.

400.34 Electromotive force sensor (e.g., back or counter EMF sensor, etc.):
Subject matter under subclass 400.32 in which phase EMF is detected to determine a motor attribute (e.g., rotor position and/or speed) which is fed back to provide commutation control data.
D. CHANGES TO THE DEFINITIONS

(1) Note. Back-EMF (or BEMF or counter-EMF or CEMF), is the voltage produced across motor windings, due to the winding turns (of the rotor/armature) passing through a magnetic field (of the stator/field), during rotation of the motor. The back-EMF is directly proportional to rotor velocity and opposite in polarity to the applied voltage. This static voltage arises from the generator action in a motor, even if the motor windings are not energized.

SEE OR SEARCH THIS CLASS, SUBCLASS:
459, for automatic motor control with time-delay using counter-electromotive force of controlled motor.

SEE OR SEARCH CLASS:
73, Measuring and Testing, for measuring (or sensing) nonelectrical parameters.
361, Electricity: Electrical Systems and Devices, subclasses 236-244 for speed measurements and signal processing thereof.
388, Electricity: Motor Control Systems, subclasses 923-934 for specific feedback circuits for motors having commutators.

400.35 With zero-crossing detection (e.g., polarity reversal, etc.):
Subject matter under subclass 400.34 in which a polarity reversal (i.e., a change in sign) in an induced voltage or current in an undriven winding/coil is determined or sensed.

400.36 With center-tap feedback circuit:
Subject matter under subclass 400.32 in which motor field windings are electrically connected to a common point and electrical parameters (i.e., current and/or voltage) are determined from the common point.

400.37 With sensor structure (e.g., tachometer, reed switch, cam-controlled switching, etc.):
Subject matter under subclass 400.01 in which any motor parameter (e.g., speed, position, etc.) is generated into a feedback signal.

(1) Note. Here, the sensor is more than a sensing circuit and typically includes a physical unit attached to the motor, motor shaft, or any other structure and capable of determining a motor parameter.

(2) Note. In “sensorless” motors, motor parameters are determined by the use of a measuring circuit and not some physical unit attached to the motor.
D. CHANGES TO THE DEFINITIONS

SEE OR SEARCH THIS CLASS, SUBCLASS:
463, for automatic motor control using a tachometer.

SEE OR SEARCH CLASS:

400.38 Magnetic field sensor or responsive device (e.g., Hall element, magneto-resistance, etc.):
Subject matter under subclass 400.37 in which a magnetic field is used to determine a motor parameter (e.g., position, speed, etc.).

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 514.31 for inductive or magnetic sensing.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, appropriate subclasses for a magnet or an electromagnet, per se.

336, Inductor Devices, subclass 30 for an inductor device having an acceleration responsive inductance adjusting means.

400.39 Rotating sensor component separate from motor structure (e.g., resolver, magnetically sensed rotating disk, etc.):
Subject matter under subclass 400.38 wherein the magnetic field is generated remotely (i.e., separately) from the motor structure (e.g., detected from a rotating disk attached to a shaft turned by the motor rotor).

SEE OR SEARCH THIS CLASS, SUBCLASS:
605, for the use of resolvers in servo systems.

400.4 Optical sensor (e.g., encoder, photodetector, etc.):
Subject matter under subclass 400.37 wherein light or radiant energy is used to determine the motor parameter (e.g., position or speed, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
577, for optical line followers for servo systems.

640, for photoelectric “error” detecting systems.

400.41 Having specific motor structure (e.g., bifilar windings, airgap dimension, auxiliary winding, phase winding with midtap, etc.):
Subject matter under subclass 400.01 wherein the motor being controlled has a structural characteristic or feature (e.g., an element or dimension, etc.) that enhances, modifies, or otherwise affects motor performance.
D.  CHANGES TO THE DEFINITIONS

(1)  Note. The intent of this subclass is to include subject matter other than the controlling circuitry.

SEE OR SEARCH THIS CLASS, SUBCLASS:
491,  for motor control of both circuit and motor structure.

538,  through 542, for motor structure adjustment control.

400.42 Brushless motor open-loop control:
Subject matter under subclass 700 for controlling the currents or voltages in (or to) the motor phases (or windings) to control motor performance (or produce torque) without motor-controlled mechanical switches (i.e., commutators, brushes, slip rings, etc.) and without feedback of any motor parameter.

(1)  Note. This subclass contains documents that control a motor without the use of specific feedback parameters, such as position, speed, torque, load, voltage, current, etc.

(2)  Note. Brushless motors are often called “self-commutating” motors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
34,  through 113, for plural, diverse, or diversely controlled motors.

362,  through 382, for motor braking.

560,  through 688, for servo system motors (e.g., stepper motors, etc.).

700,  through 724, for synchronous motors.

727,  through 832, for induction motors.

SEE OR SEARCH CLASS:
388,  Electricity: Motor Control Systems, subclasses 825-841 for open-loop speed control of motors having commutators and subclasses 848-860 for open-loop acceleration control of motors having commutators.
D. CHANGES TO THE DEFINITIONS

FOREIGN ART COLLECTIONS

The definitions below correspond to abolished subclasses from which these collections were formed. See the Foreign Art Collection schedule of this class for specific correspondences. [Note: The titles and definitions for indented art collections include all the details of the one(s) that are hierarchically superior.]

FOR 100 SPACE-DISCHARGE-DEVICE COMMUTATED MOTOR:
Foreign art collection in which space discharge devices are connected in the armature or primary circuit of the motor and are connected so as to effect the commutation of the motor.

(1) Note. The interposition of an induction transformer or other electric converter between the space discharge devices and the armature of the motor does not prevent classification herein.

FOR 101 SELF-COMMUTATED IMPULSE OR RELUCTANCE MOTORS:
Foreign art collection in which a rotary electric motor, of the type in which the rotary element tends to assume a predetermined angular position when the motor is continuously energized, is provided with a commutator or circuit making and breaking means which is actuated by the motor to determine the instants of time at which the field producing winding or windings thereof are energized and de-energized relative to the angular position of the rotary element of the motor.

FOR 102 MOTOR COMMUTATION CONTROL SYSTEMS:
Foreign art collection in which means are provided for facilitating or otherwise controlling commutation in commutator motors.

(1) Note. For example, means for preventing or reducing deleterious effects incident to, or accompanying, commutation in electric motors are included herein; such effects including large intercommutator bar currents, heating of commutator bars and brushes, flashover between bars, arcing and pitting of commutator bars and brushes, etc. Periodically or repeatedly reversing polarity of direct current supplied to commutator motors to reduce pitting, corrosion metal transfer between brush and commutator is included herein. Shifting of brushes to reduce sparking is included.
D. CHANGES TO THE DEFINITIONS

CLASS 327 - MISCELLANEOUS ACTIVE ELECTRICAL NONLINEAR DEVICES, CIRCUITS, AND SYSTEMS

Definitions Modified

Class Definition: In SECTION IV- REFERENCES TO OTHER CLASSES, SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.1-400.42 for synchronous motor commutation control systems.

Subclass 129: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.1-400.42 for synchronous motor commutation control systems.
D. CHANGES TO THE DEFINITIONS

CLASS 334 - TUNERS

Definitions Modified

Subclass 10: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.1-400.42 for synchronous motor commutation control systems.
D. CHANGES TO THE DEFINITIONS

CLASS 388 - ELECTRICITY: MOTOR CONTROL SYSTEMS

Definitions Modified

Subclass 800: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.01-400.41 for closed-loop speed control system in synchronous brushless (i.e., electronic commutating) motors.

Subclass 825: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.01-400.41 for closed-loop speed control system in synchronous brushless (i.e., electronic commutating) motors.

Subclass 842: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclasses 400.01-400.41 for closed-loop acceleration control system in synchronous brushless (i.e., electronic commutating) motors.
D. CHANGES TO THE DEFINITIONS

Subclass 848: Under SEE OR SEARCH CLASS

Delete:

The reference to Class 318

Insert:

318, Electricity: Motive Power Systems, subclass 400.42 for closed-loop acceleration control system in synchronous brushless (i.e., electronic commutating) motors.