1 **ELECTRIC MOTOR WITH NONMOTOR DRIVING MEANS (E.G., AXLE DRIVE, MANUAL DRIVE)**
2 .Manual driving means
3 **WITH PARTICULAR MOTOR-DRIVEN LOAD DEVICE**
4 .Plural, diverse or diversely controlled load device
5 ..Plural motor drive
6 .Tension-maintaining type of motor-control system
7 ..Plural, diverse or diversely controlled motors
8 .Plural, diverse or diversely controlled driving motors (e.g., driving differential gearing)
9 .Power- or motion-transmitting mechanism
10 ..Reversible drive mechanism
11 ..Variable speed mechanism
12 ...Gearing
13 ....Differential type
14 ..Motion-converting mechanism
15 ..Mechanical gearing
16 **SUPPLIED OR CONTROLLED BY SPACE-TRANSMITTED ELECTROMAGNETIC OR ELECTROSTATIC ENERGY (E.G., BY RADIO)**
17 **PORTABLE-MOUNTED MOTOR AND/OR PORTABLE-MOUNTED ELECTRICAL SYSTEMS THEREFOR**
560 **POSITIONAL SERVO SYSTEMS (E.G., SERVOMECHANISMS)**
561 .Adaptive or optimizing systems including "bang-bang" servos
562 .Time-sharing or multiplexing systems
563 .With protective or reliability increasing features (e.g., "fail-safe" systems)
564 .."Redundant" operating channels
565 ..Monitoring systems
566 ..Maneuver, force, or load-limiting
567 .Program- or pattern-controlled systems
568.1 ..With program recording or composing means
568.11 ...Multifunction manipulator (i.e., Robot)
568.12 ....Mobile robot
568.13 ....With particular program teaching method
568.14 .....Manual lead through
568.15 ....With particular interpolation means
568.16 ....With particular sensing device
568.17 ....With multimode control (e.g., course-fine, position-force, etc.)
568.18 .....Including velocity control
568.19 ....With particular coordinate transformation means
568.2 ....With plural control systems (e.g., the interaction of plural processors to control the plural joints of a single robot):
568.21 .....Including end effector (e.g., gripping jaw, micromanipulator, etc.)
568.22 ....With particular compensation (e.g., gain, offset, etc.)
568.23 .....Including program modification
568.24 ....With reliability enhancement means (e.g., monitoring, redundant circuits, etc.)
568.25 .....Including display device
569 ..Digital or numerical systems
570 ...Contouring systems
571 ....With "feed-rate" control
572 ....With "zero-offset" or tool radius correction
573 ....With interpolating means
574 ....Multiple axes point to point systems
575 ..Multiple axes analog systems
576 ...Nonmechanical line, seam or edge followers
577 ....Optical or photoelectric line followers
578 ...Cam or template followers
579 ...Multiple pass systems
580 .Vehicular guidance systems with single axis control
581 ..Radio-controlled
582 ..Celestial navigation
583 ..Landing systems
584 ..Altitude or pitch control
585 ..Roll control
586 ..Yaw control
587 ..Land vehicles

588 ..Marine vehicles
589 ...Submarine and torpedo systems
590 .Multiple mode systems
591 ..With mode-engagement features (e.g., manual to automatic)
592 ..Fine and coarse systems
593 ...Separate fine and coarse motors
594 ...Digital systems
595 ...Multiple speed synchro systems
596 ..Combined "on-off" and proportional control
597 ..Slewing systems
598 ...With a separate slewing motor
599 .Pulse-width modulated power input to motor (e.g., "duty cycle" systems)
600 .Digital or numerical systems
601 ..Digital comparison
602 ...Commutating switch-type encoder
603 ..Pulse-counting systems
604 ..Analogue comparison
605 ...Synchro or resolver (e.g., transmitter simulators)
606 .Frequency- or phase-modulated systems
607 ..Frequency comparison
608 ..Phase comparison
609 ."Reset" systems (P.I.)
610 ..With rate (P. I. D.) (e.g., reset windup prevention)
611 .With stabilizing features (e.g., anti-hunting, damping)
612 ..Electric braking near balance (e.g., dynamic)
613 ...D.C. in A.C. windings
614 ..Friction-braking near balance including magnetic or eddy current brakes
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 ."Feelback" 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
655 ....With synchro differential

656 ...Differential transformer systems
657 ....Linear differential transformer
658 ...."E" type transformer
659 ...."Microsyn" type
660 ...."Inductosyn" systems
661 ....Resolver systems
662 ...Variable capacitor systems
663 ...Potentiometer systems including autotransformers and Wheatstone bridges
664 ....Minor arc seeking
665 ....Continuous rotation, unlimited range
666 ....Controlled tap and slidewire
667 ....With a bridge in the feedback circuit
668 .....Recalibrating systems
669 ...Standing wave
670 ...Contact resistance
671 .With particular motor control system responsive to the "actuating signal"
672 ..Discontinuous or "on-off" control
673 ...Seeking switch type
674 ...Wheatstone bridge type
675 ..One transmitter or controller element follows another
676 ..Transmitter or controller element returned (e.g., force balance systems)
677 ..With particular servoamplifier
678 ...Differential amplifier
679 ...Diverse types of amplifiers in different stage
680 ...Magnetic servoamplifiers
681 ...Solid-state servoamplifiers
682 ...Rotating amplifier (e.g., "Ward Leonard" control)
683 ..With particular phase discriminator
684 ..With particular modulator or detector (e.g., choppers)
685 .."Step-by-step" motors in closed-loop servos
686 ..Reciprocating or oscillating motors
687 ..Linear movement motors
688 ..Shaded pole motors
689 **TORQUING MOTORS**
690 **SELF-SYNCHRONOUS TYPE OF MOTOR**
691 .With means to amplify transmitter signals
692 .Having induction or "selsyn" type transmitter
693 .Having impedance-type transmitter
694 .Having commutated dynamoelectric machine transmitter
695 .Having commutating switch-type transmitter
696 **OPEN-LOOP STEPPING MOTOR CONTROL SYSTEMS**
34 **PLURAL, DIVERSE OR DIVERSELY CONTROLLED ELECTRIC MOTORS**
35 .Motors with diverse motions (e.g., reciprocating and rotary motors)
37 .Plural reciprocating or oscillating motors
38 .Plural linear-movement motors
39 .Work and feed motors (e.g., indexing)
40 .Motor biased against rotation
41 .Having electrical synchronizing interconnections
42 ..Between windings on auxiliary dynamo-electric machines
43 ..D.C. or A.C. commutator motors with slip rings
44 ..Between induction motor secondaries
45 .Mechanically coupled in fixed ratio of movement
46 ..Motors having unlike operating characteristics
47 ...Synchronous and nonsynchronous motors
48 ..Mechanically coupled in torque opposition
49 .Motors electrically connected in cascade or tandem
50 ..With means for effecting other motor interconnections
51 .Plural, diverse motor controls for different motors
52 .Slipping and/or racing control for electric motors
53 .Plural, diverse motor controls
54 ..Motor-reversing
55 ...With running-speed control
56 ....And braking
57 ...And braking
58 ...And acceleration control
59 ..Running-speed control
60 ...And braking
61 ...And acceleration control

62 ...And automatic starting and/or stopping and/or with time delay
63 ..Braking
64 ..Acceleration control
65 .Motor-reversing
66 .Running-speed control
67 ..Diverse speeds for different motors
68 ..Relative motor speed control
69 ...With speed-difference detector
70 ....Electrical-type detectors
71 .....Voltage and/or current difference detector
72 .....Dynamoelectric machine detector
73 .....Synchronously operated impedance detectors
74 .....Synchronously actuated switch detectors
75 ......Plural switches connected in series
76 ....Differential-gearing detector
77 ...Controlling motor speed in response to speed of another motor
78 ....Controlling A.C. frequency or rate of electrical impulses to other motor
79 ...Control of both armature (or primary) and field (or secondary) circuits
80 ...Armature or primary circuit control
81 ...Field secondary circuit control
82 ..Armature or primary circuit control
83 ...Series-parallel armature circuit connections
84 ..Field or secondary circuit control
85 .Synchronizing or phasing control
86 .Braking
87 ..Motor used as braking generator (dynamic braking)
88 ...Load or current division during braking
89 ...Motor as exciter for another motor
90 .Acceleration control
91 ..Accelerating motors in succession or selectively
92 ..Control of both armature (or primary) and field (or secondary) circuits
93 ...Series-parallel connected armature or primary circuits
94 ..Armature or primary circuit control
95 ...Series-parallel connections
96 ....With armature circuit impedance
97 ..Field or secondary circuit control
98 .Load control
99 ..Fixed ratio of load or current division
100 ...By field or secondary circuit control
101 .Starting and/or stopping
102 ..Sequential or successive starting and/or stopping
103 ..Selective starting and/or stopping
104 ..Armature (or primary) circuit control
105 .Plural, diverse or diversely controlled sources of armature (or primary) supply
106 ..Diverse sources
107 ...A.C. and D.C.
108 ....Different voltages
109 ...Different voltages
110 ...Different frequencies
111 .Series-parallel connected motors
112 .Parallel connected motors
113 .Series connected motors
114 **IMPACT, MECHANICAL SHOCK, OR VIBRATION-PRODUCING MOTORS**
115 **MOTOR WITH DIVERSE MOTIONS (E.G., ROTARY AND RECIPROCATING)**
116 **NONMAGNETIC MOTOR**
117 .Thermoelectric motor
118 **MAGNETOSTRICTIVE MOTOR**
119 **RECIPROCATING OR OSCILLATING MOTOR**
120 .Stopping after predetermined number of reciprocations or cycles (including single cycle)
121 .Having means to produce a progressing or traveling motor field flux
122 .Plural, diverse or diversely controlled motor windings

123 ..Polyphase or diverse or diversely controlled sources of motor supply
124 ...A.C. and D.C. sources
125 ..Unidirectionally conductive devices in energizing circuit
126 .Energizing winding circuit control
127 ..Automatic in response to predetermined position, movement or condition in or of the motor or driven device
128 ...Noise, sound, vibration, movement or position of motor
129 ..By means for producing periodic electrical pulses in the energizing circuit
130 ...Electrical oscillation or condenser charging and/or discharging circuits
131 ...Motor or escapement-controlled means
132 ..By space-discharge or unidirectionally conductive devices in energizing circuit
133 ..By impedance devices in energizing circuit
134 ..By circuit making and/or braking devices
135 **LINEAR-MOVEMENT MOTORS**
136 **AUXILIARY MEANS FOR PRODUCING MECHANICAL STARTING OR ACCELERATING TORQUE**
137 .By auxiliary motor
139 **BATTERY-FED MOTOR SYSTEMS**
140 **GENERATOR-FED MOTOR SYSTEMS HAVING GENERATOR CONTROL**
141 .Automatic generator control and/or with time-delay means
142 ..Responsive to diverse conditions or with time-delay means
143 ...Plural electrical conditions
144 ..Armature or primary current of motor
145 ..Terminal voltage or counter e.m.f. of motor
146 ..Speed of motor or driven device
147 ..Speed or frequency of generator or its drive means
148 .Alternating-current-motor system
149 .With plural, diverse or diversely controlled generators
150 .With flywheel on generator or on motor
151 .Control of both the generator and the circuit to the motor
152 ..With motor control
153 .Control of both the generator and the motor
154 ..Control of excitation (field) circuit of both
156 .Plural, diverse or diversely actuated, generator control means
157 .Generator speed control
158 .Generator field circuit control
159 **HAVING ROTOR ELEMENT BIASED AGAINST ROTATION**
160 .By resilient biasing means (e.g., spring)
161 **WITH FLYWHEEL OR MASSIVE ROTARY MEMBER**
162 **CONTROL BY PATTERNS OR OTHER PREDETERMINED SCHEDULE MEANS**
163 .Motor running-speed control
164 ..Cyclically varying or repeated speed schedules
700 **SYNCHRONOUS MOTOR SYSTEMS**
400.01 .Brushless motor closed-loop control
400.02 ..Vector control (e.g., dq-axis control, 3-2 phase conversion, etc.)
400.03 ..Plural reference comparison (e.g., reference changes during startup, upper/lower reference, etc.)
400.04 ..Specific processing of feedback signal or circuit therefore (i.e., A-D conversion, compression, or modification)
400.05 ...With reference signal generation (e.g., from external system, mechanical oscillator, etc.)
400.06 ...Comparator circuit or method
400.07 ...Plural diverse feedback (e.g., torque and speed, load and speed, etc.)
400.08 ...With nonmotor parameter or remote condition detected (e.g., temperature, light, airflow, position of diverse object, etc.)

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.)
400.1 ...With timing or delay
400.11 ...With separate starting mode or "ramp-up" mode (e.g., open-loop control for startup, startup initialization, etc.)
400.12 ...With table lookup, stored map, or memory table (e.g., speed table, stored current profile, etc.)
400.13 ..With timing, delay, or clock pulse counting circuit or generation
400.14 ...Phase shifted as function of speed or position
400.15 ..With torque or load determination (e.g., by calculation, detection, or estimation, etc.)
400.16 ..Control or position information digitally stored on disk (e.g., computer hard drive position detection, etc.)
400.17 ..Modification or waveshaping of switching control signal (e.g., switching control input to inverter, etc.)
400.18 ..With manual control (e.g., foot switch, surgical tool, etc.)
400.19 ..Slew rate control (e.g., slew limiting, etc.)
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, EMR, RFI, 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., freewheeling, 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, reed switch, cam-controlled switching, etc.)
400.38 ...Magnetic field sensor or responsive device (e.g., Hall element, magneto-resistance, 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
701 .Hysteresis or reluctance motor systems
702 .Antihunting or damping
703 .Braking
704 .Pole changing motor winding circuits
705 .Synchronization systems
706 ..With armature power removal upon failure to synchronize or loss of synchronism
707 ...Upon failure to resynchronize
708 ...Responsive to thermal electrical element in system
709 ..Having different armature voltage prior to synchronism
710 ..With d.c. field removal
711 ...With electronic control element in system
712 ..With field excitation application
713 ...Responsive to slip voltage frequency in d.c. field winding
714 ...Responsive to armature current
715 ...Responsive to rotor speed or rotor driven member
716 .Field winding circuits
717 ..Responsive to a motor condition
718 ...Induced voltage in field winding
719 ...Speed responsive field power sources
720 .Armature winding circuits
721 ..Responsive to rotor shaft position or speed
722 ..Having electronic power conversion circuit
723 ..Having variable frequency supply
724 ..Having a plurality of windings or winding portions
725 **REPULSION MOTOR SYSTEMS**
726 .With added motor winding or convertible to series motor
727 **INDUCTION MOTOR SYSTEMS**
728 .Repulsion start
729 .Power-factor control
730 .With plural separately movable rotors
731 .With voltage source connected to motor secondary
732 ..Electronic device controls current in secondary circuit
733 ..Commutator connected to secondary winding
734 ..Slip rings connected to secondary winding
735 ...Rotor shaft coupled to dynamoelectric machine
736 ....Slip rings connected to dynamoelectric machine winding
737 .Self-cascaded motor windings
738 .With commutated winding
739 .Reversing
740 ..With diverse motor operation
741 ...With braking
742 ....Electromagnetic brakes
743 .....Generator action
744 .....Plugging
745 ..With controlled saturable reactor in primary circuit
746 ...Two phase motor
747 ..Two phase motor
748 ...With plural primary windings or winding portions having common connection
749 ..Operating from a single phase source
750 ...Shaded pole motor
751 ...Split phase motor with capacitor interchangeably connected in series with either primary winding
752 ....With controlled electronic device to provide the series connection
753 ...With de-energizable start winding
754 ....With separate winding or winding portion energized for each direction of rotation
755 ....Automatic current reversal on start winding
756 ..With controlled electronic switch for phase reversal
757 .Braking
758 ..With diverse operation
759 ..Dynamic braking
760 ...Direct current primary winding braking circuit
761 ....Rotating rotor controls braking current in primary winding
762 ....With a.c. to d.c. conversion circuit
763 ..Reversal of power to primary winding
764 ...Three phase power reversal

765 ..Eddy current braking circuits
766 .Primary and secondary circuits
767 .Primary circuit control
768 ..Three phase motor operated from single phase source
769 ...With dynamoelectric converter
770 ..Dual voltage motors
771 ..Delta-wye, plural wye, or plural delta connected primary windings
772 ..Plural speed
773 ...Pole changing
774 ....Single phase motor
775 .....Separate primary running winding for each pole number, alternately energized
776 .....Entire primary running winding energized for each running speed
777 ....Separate primary running winding for each pole number, alternately energized
778 ..Starting control
779 ...With speed control
780 ...Three phase motor with variable transformer to initially adjust voltage to motor windings
781 ...Operating from a single phase source
782 ....With protective features
783 .....Thermal starting and thermal overload protection
784 ....Impedance for reducing current during starting operation
785 ....Start winding removed during running operation
786 .....By electronic switch
787 ......With transformer for sensing the run winding current
788 ......With variable temperature coefficient resistor in switch control circuit
789 .....By electromagnetic switch
790 ......With relay coil in series with main winding
791 .....By thermal switch
792 ......With variable temperature coefficient impedance element
793 .....By centrifugal switch
794 ....Capacitor run motor with different capacitance at starting
795 .....With plural capacitors
796 ....Saturable winding in capacitor run motor circuit
797 ....Phase splitting using stator winding mutual inductance or saturable winding
798 ..Responsive to motor condition
799 ...Responsive to speed or rotation phase angle
800 ....With controlled power conversion
801 .....Including inverter
802 ......Responsive to an additional condition
803 ....With controlled a.c. to d.c. circuit in inverter supply
804 ....With controlled magnetic reactance
805 ...Responsive to motor voltage
806 ..Condition responsive
807 ..Frequency control
808 ...With voltage magnitude control
809 ...With voltage phase angle control
810 ...With voltage pulse time control
811 ....Pluse width modulation or chopping
812 ..Voltage control
813 ...With transformer
814 ...With impedance control
815 ....Saturable reactor
816 ...Single phase, split phase motors
817 ....With capacitor
818 .Secondary circuit control
819 ..Open secondary member or portion thereof with means to open or close the circuit thereto
820 ..Closed secondary member or member portion with means to change electrical characteristics thereof
821 ..Impedance control of secondary circuit
822 ...Responsive to motor condition
823 ....Rotor speed or position responsive
824 .....Centrifugal force of rotor controls secondary circuit impedance
825 ....Induction motor current
826 .....Primary motor current

827 ....Frequency of secondary current
828 ....Secondary voltage
829 ...By manual operation
830 .With relatively movable cooperating motor parts to control energized motor
831 ..Axially movable cooperating parts
832 ..Dual stators, one or both angularly movable
244 **ALTERNATING CURRENT COMMUTATING MOTORS**
245 .Universal or A.C.-D.C. motors
246 **SERIES MOTORS**
247 .Convertible for nonseries motor operation
248 .With plural, diverse or diversely connected or controlled sources of e.m.f.
249 .Control by motor circuit impedance
250 ..Impedance in series with field windings and in parallel to armature winding
251 .Field circuit control
252 ..Plural, diverse or diversely connected or controlled field coils
253 **HOMOPOLAR OR UNIFORM FIELD MOTORS**
254.1 **SWITCHED RELUCTANCE MOTOR COMMUTATION CONTROL**
254.2 .Having asymmetric half-bridge
255 **PLURAL DIVERSE MOTOR CONTROLS**
256 .Motor-reversing
257 ..With running-speed control
258 ...And braking
259 ....And acceleration control
260 ...And acceleration control
261 ..With braking
262 ...And acceleration control
263 ..With acceleration control
264 ..With automatic starting and/or stopping
265 ...Stopping upon predetermined movement of or position of motor or driven device
266 ....At limit-of-travel of motor or driven device
267 .....Dual control circuits alternately energized
268 .Running-speed control
269 ..With braking
270 ...And acceleration control
271 ..With acceleration control
272 ..With automatic starting and/or stopping
273 .Motor braking
274 ..With acceleration control
275 ..With automatic starting and/or stopping
276 .Acceleration control
277 ..With automatic starting and/or stopping
278 ...In response to an electrical condition
279 ....Automatic stopping means less responsive during acceleration
280 **MOTOR-REVERSING**
281 .Periodic- or intermittent-reversing
282 ..In response to movement or position (e.g., limit of travel) of motor or driven device
283 .Automatic and/or with time-delay means
284 ..With means to delay reversing until motor substantially stops
285 ..Instant of, or passage or predetermined time or having time-delay means
286 ..Movement or position of motor or driven device
287 .Armature or primary circuit control
288 ..Plural, diverse or diversely controlled armature windings
289 ...Phase-reversal
290 ...Selectively energized windings
291 ..Armature or primary current reversal
292 ...By shifting motor brushes or selecting appropriate set of brushes
293 ...Reversing polarity of current supplied to armature circuit
294 ....Wheatstone bridge type
295 ....Potentiometer-controlled
296 .Field circuit control
297 ..Plural, diverse or diversely controlled field windings
298 ...Simultaneous energization
299 ....With means for short-circuiting a winding
300 ..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.

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.

362 **BRAKING**
363 ."Spotting" or adjustment of braking controller during coasting
364 .Automatic and/or with time-delay means
365 ..Plural diverse conditions or with time delay
366 ..Condition of motor or driven device
367 ...Armature or primary current
368 ...Armature or primary circuit voltage or terminal or counter e.m.f. voltage
369 ...Speed, acceleration, movement or position of motor or driven device
370 .Plural, diverse or diversely controlled braking means
371 ..Including both friction braking "plugging" and/or dynamic braking
372 .Friction braking
373 ."Plugging" or application of reverse power to motor
374 ..Energy flow interrupted when motor stops
375 .Dynamic braking
376 ..Regenerative
377 ...With additional source of e.m.f.
378 ....In series with armature or primary circuit
379 ..Locally closed armature circuit
380 ...Closed through impedance or the like
381 ...With field or secondary circuit control
382 .By auxiliary electric generator or by magnetic attraction or repulsion devices
383 **"ANTI-BRAKING" OR BRAKING-PREVENTION MEANS**
430 **MOTOR LOAD, ARMATURE CURRENT OR FORCE CONTROL DURING STARTING AND/OR STOPPING**
431 .Initial, "cracking" or "starting from rest" torque control
432 **CONSTANT MOTOR CURRENT, LOAD AND/OR TORQUE CONTROL**
433 .Control of motor load or device driven
434 **LIMITATION OF MOTOR LOAD, CURRENT, TORQUE OR FORCE (E.G., PREVENTING OVERLOAD)**
436 **NONRUNNING, ENERGIZED MOTOR**
437 **PHASING OR ANGULAR OR LINEAR POSITIONAL CONTROL OF MOVABLE ELEMENT OF THE MOTOR**
438 **POWER FACTOR CONTROL OF ARMATURE OR LINE CIRCUIT**
440 **HAVING PLURAL, DIVERSE OR DIVERSELY CONTROLLED SOURCES**
441 .A.C. and D.C.
442 .Different voltages
443 **PERIODIC, REPETITIOUS OR SUCCESSIVE OPERATIONS CONTROL OF MOTOR, INCLUDING "JOG" AND "INCH" CONTROL**
444 .Variable periods or intervals between controlling operations
445 **AUTOMATIC AND/OR WITH TIME-DELAY MEANS (E.G., AUTOMATIC STARTING AND/OR STOPPING)**
446 .With nonautomatic control means (e.g., manual)
447 .Nonresponsive or less responsive for limited periods
448 .Anti-hunting
449 .With respect to a fixed standard, master or reference device
450 ..Electrical detector
451 ..Mechanically vibrating device as reference device (e.g., tuning fork)
452 .Plural, diverse conditions or with time-delay means
453 ..Electrical condition

454 ...Plural, diverse electrical conditions
455 ....Voltage and current (e.g., watts)
456 .Rate-of-change of a condition
457 ..Interia-type detector
458 ..Electrical condition
459 .Terminal voltage or counter-electromotive force of controlled motor
460 .Sound, supersonic vibration or mechanical vibration
461 .Speed or rate-of-movement
462 ..Centrifugal-type detector
463 ..Tachometer-type detector
464 ...Electric generator tachometer
465 ..In excess of a predetermined valve
466 .Movement, position, or limit-of-travel
467 ..Plural sensing means for determining plural positions or plural limits-of travel
468 ..Limit-of-travel control means
469 ...Overloading limit-of-travel-type control means
470 ..Magnitude of movement or revolutions
471 .Responsive to thermal conditions
472 ..Of motor control means
473 ..In or about the motor being controlled
474 .Motor load, armature or primary or secondary circuit current
475 ..Mechanical-type detector (e.g., by yielding spring devices)
476 ..In excess of a predetermined magnitude
477 ...Intentionally increased load
478 .Electrical conditions in circuit other than controlled motor circuit
479 ..Voltage
480 .Radiant energy
481 .Pressure in a fluid or granular material
482 .Level of fluid or granular material
483 .Moisture content or wetness
484 .Time or with time-delay means
485 ..Dash-pot or other mechanical delay means
486 ..Pilot- or servo-motors
487 ..Electromagnetic or inductive time-delay means
488 .Responsive to stress in body or material
489 .Responsive to direction, inclination or angular position of bodies
490 **WITH SIGNALS, METERS, RECORDERS OR TESTING DEVICES**
491 **CONTROL OF BOTH MOTOR CIRCUIT AND MOTOR STRUCTURE**
492 **MOTOR MAGNETIC ENERGY DISSIPATION**
493 **CONTROL OF BOTH ARMATURE (OR PRIMARY) CIRCUIT AND FIELD (OR SECONDARY) CIRCUIT**
494 **ARMATURE (OR PRIMARY) CIRCUIT CONTROL**
495 .Plural, diverse or diversely controlled, armature or primary windings
496 ..Polyphase windings
497 ..Series-parallel
498 ..Energized or controlled in predetermined sequence
499 ..Wound or energized in magnetic opposition
500 .Plural sources of voltage (including counter e.m.f. cells)
501 .By shunting armature or primary winding
502 .Variable length or tapped armature winding
503 .Frequency or pulsation control
504 .Voltage control
505 .By means to space-discharge devices
506 ..Plural, diverse or diversely connected or controlled space-discharge devices
507 ..Having discharge-control means (e.g., grids)
508 .Impedance-controlled
509 ..Plural, diverse or diversely controlled impedances
510 ...Including both reactor and condenser
511 ..Inherently or self-variable impedance
512 ..Inductive reactor controlled
513 ...Having auxiliary means for saturating reactor core
514 ..Resistor-controlled
515 ...Having short-circuiting means
516 ....Short-circuited step-by-step
519 .By armature or primary circuit-making and/or breaking

520 ..Electromagnetically actuated
521 **FIELD OR SECONDARY CIRCUIT CONTROL**
523 .Plural, diverse or diversely connected or controlled field windings
524 ..Convertible number-of-poles type (e.g., 4-pole or 6-pole)
525 ..Differentially wound or energized windings
526 ..Series-parallel
527 ..Series field winding
528 ..With means to short circuit a field winding
529 ..Selectively energized
530 .Plural, diverse or diversely connected or controlled sources of field circuit voltage
531 .Variable length or tapped field winding
532 .By means of space-discharge device in field circuit
533 .Impedance-controlled
534 ..Plural, diverse or diversely connected or controlled field circuit impedances
535 ...Wheatstone bridge
536 .By field circuit making and/or breaking
537 ..Intermittently operated
538 **MOTOR STRUCTURE ADJUSTMENT OR CONTROL**
539 .Both armature and field structures rotatable or adjustable
540 .Rotor element movable axially
541 .Brush or other current-collector control
542 ..Having movement toward or from cooperating part (e.g., brush lifted from commutator)
543 **THREE-OR-MORE-POSITIONS MOTOR CONTROLLER SYSTEMS**
544 .With other motor control device
545 ..Main line switch
546 .Plural, diverse or diversely controlled controllers
547 ..Plural control stations
548 .Plural control stations
549 .Return to "off", "starting" or "neutral" positions
550 ..Power-operated controllers
551 .Knee- or foot-operated controllers
552 .Power-actuated controllers
553 ..Separately actuated controller contacts
554 ...Electromagnetic actuated
555 ..Electromagnetic actuated
556 ...Reciprocating or oscillating electromagnetic means
557 ...Intermittent or step-by-step operation
558 **MISCELLANEOUS**

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**

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 COMMUTATED MOTOR (318/138)**
FOR 101 **SELF-COMMUTATED IMPULSE OR RELUCTANCE MOTORS (318/254)**
FOR 102 **MOTOR COMMUTATION CONTROL SYSTEMS (318/439)**

DIGESTS

DIG 2 **WINDSHIELD WIPER CONTROLS**