CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H02 GENERATION; CONVERSION OR DISTRIBUTION OF ELECTRIC POWER

H02K DYNAMO-ELECTRIC MACHINES (dynamo-electric relays H01H 53/00; conversion of DC or AC input power into surge output power {H03K 3/53})

NOTES

1. This subclass covers the structural adaptation of dynamo-electric machines for the purpose of their control.
2. This subclass does not cover starting, regulating, electronically commutating, braking, or otherwise controlling motors, generators or dynamo-electric converters, in general, which is covered by subclass H02P.
3. Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "microstructural devices" and "microstructural systems".
4. Group H02K 16/00 takes precedence over groups H02K 17/00 - H02K 53/00.
   {This Note corresponds to IPC Note (1) relating to H02K 17/00 - H02K 53/00.}
5. {In this subclass, it is desirable to add the indexing codes of H02K 2201/00-H02K 2213/12.}

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 **Details of the magnetic circuit** (magnetic circuits for relays H01H 50/16)

1/02 . characterised by the magnetic material

1/04 . characterised by the material used for insulating the magnetic circuit or parts thereof

1/06 . characterised by the shape, form or construction

1/08 . . Salient poles

1/10 . . . Commutating poles

1/12 . . Stationary parts of the magnetic circuit

1/14 . . . Stator cores with salient poles

1/141 . . . . {consisting of C-shaped cores}

1/143 . . . . . {of the horse-shoe type}

1/145 . . . . {having an annular coil, e.g. of the claw-pole type}

1/146 . . . . {consisting of a generally annular yoke with salient poles}

1/148 . . . . . {Sectional cores (H02K 1/141 takes precedence)}

1/16 . . . Stator cores with slots for windings

1/165 . . . . {Shape, form or location of the slots}

1/17 . . . Stator cores with permanent magnets

1/18 . . . Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures

1/182 . . . . {to stators axially facing the rotor, i.e. with axial or conical air gap}

1/185 . . . . {to outer stators}

1/187 . . . . {to inner stators}

1/20 . . . with channels or ducts for flow of cooling medium

1/22 . . Rotating parts of the magnetic circuit

1/223 . . . {Rotor cores with windings and permanent magnets (for additional excitation in synchronous motors or generators H02K 21/042; in synchronous motors having additional short-circuited winding for starting as an asynchronous motor H02K 21/46)}

1/24 . . . Rotor cores with salient poles {; Variable reluctance rotors}

1/243 . . . . {of the claw-pole type}

1/246 . . . . {Variable reluctance rotors}

1/26 . . . Rotor cores with slots for windings

1/265 . . . . {Shape, form or location of the slots}

1/27 . . . Rotor cores with permanent magnets

1/2706 . . . . Inner rotors

1/2713 . . . . . the magnetisation axis of the magnets being axial, e.g. claw-pole type

1/272 . . . . . the magnetisation axis of the magnets being perpendicular to the rotor axis

1/2726 . . . . . the rotor consisting of a single magnet or two or more axially juxtaposed single magnets

1/2733 . . . . . Annular magnets

1/274 . . . . . the rotor consisting of two or more circumferentially positioned magnets

1/2746 . . . . . the rotor consisting of magnets arranged with the same polarity, e.g. consequent pole type

1/2753 . . . . . the rotor consisting of magnets or groups of magnets arranged with alternating polarity

1/276 . . . . . Magnets embedded in the magnetic core, e.g. interior permanent magnets [IPM]

1/2766 . . . . . {having a flux concentration effect}

1/2773 . . . . . {consisting of tangentially magnetized radial magnets}
1/278 . . . . . Surface mounted magnets; Inset magnets
1/2781 . . . . . Magnets shaped to vary the mechanical air gap between the magnets and the stator
1/2783 . . . . . with magnets arranged in Halbach arrays
1/2786 . . . . Outer rotors
1/2787 . . . . . the magnetisation axis of the magnets being perpendicular to the rotor axis
1/2788 . . . . . the rotor consisting of a single magnet or two or more axially juxtaposed single magnets
1/2789 . . . . . the rotor consisting of two or more circumferentially positioned magnets
1/279 . . . . . Magnets embedded in the magnetic core
1/2791 . . . . . Surface mounted magnets; Inset magnets
1/27915 . . . . . Magnets shaped to vary the mechanical air gap between the magnets and the stator
1/2792 . . . . . with magnets arranged in Halbach arrays
1/2793 . . . . Rotors axially facing stators
1/2795 . . . . . the rotor consisting of two or more circumferentially positioned magnets
1/2796 . . . . . where both axial sides of the rotor face a stator
1/2798 . . . . . where both axial sides of the stator face a rotor
1/28 . . . Means for mounting or fastening rotating magnetic parts on to, or to, the rotor structures
1/30 . . . . using intermediate parts, e.g. spiders
1/32 . . . with channels or ducts for flow of cooling medium
1/325 . . . . {between salient poles}
1/34 . . Reciprocating, oscillating or vibrating parts of the magnetic circuit

3/00 Details of windings

3/02 . Windings characterised by the conductor material
3/04 . Windings characterised by the conductor shape, form or construction, e.g. with bar conductors
3/12 . . arranged in slots
3/14 . . . with transposed conductors, e.g. twisted conductors
3/16 . . . for auxiliary purposes, e.g. damping or commutating
3/18 . . Windings for salient poles
3/20 . . . for auxiliary purposes, e.g. damping or commutating
3/22 . . consisting of hollow conductors
3/24 . . with channels or ducts for cooling medium between the conductors
3/26 . . consisting of printed conductors
3/28 . . Layout of windings or of connections between windings (windings for pole-changing H02K 17/06, H02K 17/14, H02K 19/12, H02K 19/32)
3/30 . Windings characterised by the insulating material
3/32 . Windings characterised by the shape, form or construction of the insulation
3/325 . . {for windings on salient poles, such as claw-shaped poles}
3/34 . . between conductors or between conductor and core, e.g. slot insulation
3/345 . . . {between conductor and core, e.g. slot insulation}
3/38 . . around winding heads, equalising connectors, or connections thereto
3/40 . . for high voltage, e.g. affording protection against corona discharges
3/42 . Means for preventing or reducing eddy-current losses in the winding heads, e.g. by shielding
3/44 . Protection against moisture or chemical attack; Windings specially adapted for operation in liquid or gas
3/46 . Fastening of windings on the stator or rotor structure
3/47 . . Air-gap windings, i.e. iron-free windings
3/48 . . in slots
3/487 . . . Slot-closing devices
3/493 . . . . magnetic
3/50 . . Fastening of winding heads, equalising connectors, or connections thereto
3/505 . . . {for large machine windings, e.g. bar windings (H02K 3/51 takes precedence)}
3/51 . . . applicable to rotors only
3/52 . . Fastening salient pole windings or connections thereto
3/521 . . . {applicable to stators only}
3/522 . . . . {for generally annular cores with salient poles}
3/524 . . . . {for U-shaped, E-shaped or similarly shaped cores}
3/525 . . . . {Annular coils, e.g. for cores of the claw-pole type}
3/527 . . . {applicable to rotors only}
3/528 . . . . {of the claw-pole type}

5/00 Casings; Enclosures; Supports

5/02 . Casings or enclosures characterised by the material thereof
5/04 . Casings or enclosures characterised by the shape, form or construction thereof
5/06 . . Cast metal casings
5/08 . . Insulating casings
5/10 . . with arrangements for protection from ingress, e.g. water or fingers
5/12 . . specially adapted for operating in liquid or gas (combined with cooling arrangements H02K 9/00)
5/124 . . . Sealing of shafts
5/128 . . . using air-gap sleeves or air-gap discs
5/1282 . . . . {the partition wall in the air-gap being non cylindrical}
5/1285 . . . . {of the submersible type}
5/132 . . . Submersible electric motors (H02K 5/128 takes precedence)
5/136 . . . explosion-proof
5/14 . . Means for supporting or protecting brushes or brush holders
5/141 . . . {for cooperation with slip-rings}
5/143 . . . {for cooperation with commutators}

5/145 . . . . {Fixedly supported brushes or brush holders, e.g. leaf or leaf-mounted brushes}
5/146 . . . . {Pivotally supported brushes or brush holders}
5/148 . . . . {Slidably supported brushes}
5/15 . . Mounting arrangements for bearing-shields or end plates
5/16 . . Means for supporting bearings, e.g. insulating supports or means for fitting bearings in the bearing-shields (magnetic bearings H02K 7/09)
5/161 . . . {radially supporting the rotary shaft at both ends of the rotor (H02K 5/165, H02K 5/167, H02K 5/173 take precedence)}
5/163 . . . {radially supporting the rotary shaft at only one end of the rotor (H02K 5/165, H02K 5/167, H02K 5/173 take precedence)}
5/165 . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly (H02K 5/167, H02K 5/173 take precedence)}
5/167 . . . using sliding-contact or spherical cap bearings
5/1672 . . . . {radially supporting the rotary shaft at both ends of the rotor (H02K 5/1677 takes precedence)}
5/1675 . . . . {radially supporting the rotary shaft at only one end of the rotor (H02K 5/1677 takes precedence)}
5/1677 . . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly}
5/173 . . . using bearings with rolling contact, e.g. ball bearings
5/1732 . . . . {radially supporting the rotary shaft at both ends of the rotor (H02K 5/1737 takes precedence)}
5/1735 . . . . {radially supporting the rotary shaft at only one end of the rotor (H02K 5/1737 takes precedence)}
5/1737 . . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly}
5/18 . . with ribs or fins for improving heat transfer
5/20 . . with channels or ducts for flow of cooling medium
5/203 . . . {specially adapted for liquids, e.g. cooling jackets}
5/207 . . . {with openings in the casing specially adapted for ambient air}
5/22 . . Auxiliary parts of casings not covered by groups H02K 5/06-H02K 5/20, e.g. shaped to form connection boxes or terminal boxes
5/225 . . . {Terminal boxes or connection arrangements (specially adapted for submersible motors H02K 5/132)}
5/24 . specially adapted for suppression or reduction of noise or vibrations
5/26 . Means for adjusting casings relative to their supports

7/00 Arrangements for handling mechanical energy structurally associated with dynamo-electric machines, e.g. structural association with mechanical driving motors or auxiliary dynamo-electric machines

7/003 . {Couplings; Details of shafts (means for mounting rotors on shafts H02K 1/28)}
7/006 . {Structural association of a motor or generator with the drive train of a motor vehicle}
7/02 . Additional mass for increasing inertia, e.g. flywheels
7/025 . . {for power storage}
7/04 . Balancing means
7/06 . Means for converting reciprocating motion into rotary motion or vice versa
7/061 . . {using rotary unbalanced masses (for generating mechanical vibrations in general B06B 1/16)}
7/063 . . . {integrally combined with motor parts, e.g. motors with eccentric rotors}
7/065 . . Electromechanical oscillators; Vibrating magnetic drives
7/07 . . using pawls and ratchet wheels
7/075 . . using crankshafts or eccentrics
7/08 . Structural association with bearings
7/081 . . {specially adapted for worm gear drives (H02K 7/09 takes precedence)}
7/083 . . {radially supporting the rotary shaft at both ends of the rotor (H02K 7/086, H02K 7/09 take precedence)}
7/085 . . {radially supporting the rotary shaft at only one end of the rotor (H02K 7/086, H02K 7/09 take precedence)}
7/086 . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly (H02K 7/09 takes precedence)}
7/088 . . . {radially supporting the rotor directly}
7/09 . . with magnetic bearings
7/10 . Structural association with clutches, brakes, gears, pulleys or mechanical starters

NOTE

{Group H02K 7/12 takes precedence over groups H02K 7/102 - H02K 7/118}

7/1004 . . {with pulleys}
7/1008 . . . {structurally associated with the machine rotor (H02K 7/1012 takes precedence)}
7/1012 . . . {Machine arranged inside the pulley}
7/1016 . . . . {Machine of the outer rotor type}
7/102 . . with friction brakes
7/1021 . . . {Magnetically influenced friction brakes}
7/1023 . . . . {using electromagnets}
7/1025 . . . . . {using axial electromagnets with generally annular air gap}
7/1026 . . . . {using stray fields}
7/1028 . . . . . {axially attracting the brake armature in the frontal area of the magnetic core}
7/104 . . with eddy-current brakes
7/106 . . with dynamo-electric brakes
7/108 . . with friction clutches
7/1085 . . . {Magnetically influenced friction clutches}
7/11 . . with dynamo-electric clutches
7/112 . . with friction clutches in combination with brakes
7/1125 . . . {Magnetically influenced friction clutches and brakes}
7/114 . . with dynamo-electric clutches in combination with brakes
7/116 . . with gears
7/1163 . . . {where at least two gears have non-parallel axes without having orbital motion}

7/1166 . . . . {comprising worm and worm-wheel (structural association with bearings specially adapted for worm gear drives H02K 7/081)}
7/118 . . with starting devices
7/1185 . . . {with a mechanical one-way direction control, i.e. with means for reversing the direction of rotation of the rotor}
7/12 . . with auxiliary limited movement of stators, rotors or core parts, e.g. rotors axially movable for the purpose of clutching or braking
7/125 . . . {magnetically influenced}
7/14 . Structural association with mechanical loads, e.g. with hand-held machine tools or fans (with fan or impeller for cooling the machine H02K 9/06)
7/145 . . {Hand-held machine tool}
7/16 . . for operation above the critical speed of vibration of the rotating parts
7/18 . Structural association of electric generators with mechanical driving motors, e.g. with turbines
7/1807 . . {Rotary generators (H02K 7/006 takes precedence)}
7/1815 . . . {structurally associated with reciprocating piston engines (general aspects of generating sets, e.g. housing, F02B 63/04)}
7/1823 . . . {structurally associated with turbines or similar engines}
7/183 . . . . {wherein the turbine is a wind turbine (adaptation of a wind turbine to an electric generator F03D 9/25)}
7/1838 . . . . . {Generators mounted in a nacelle or similar structure of a horizontal axis wind turbine}
7/1846 . . . {structurally associated with wheels or associated parts (dynamos arranged in the wheel hub of cycles B62J 6/12)}
7/1853 . . . {driven by intermittent forces}
7/1861 . . . {driven by animals or vehicles (H02K 7/1853 takes precedence)}
7/1869 . . {Linear generators; sectional generators}
7/1876 . . . {with reciprocating, linearly oscillating or vibrating parts}
7/1884 . . . . {structurally associated with free piston engines}
7/1892 . . {Generators with parts oscillating or vibrating about an axis}
7/20 . Structural association with auxiliary dynamo-electric machines, e.g. with electric starter motors or exciters

9/00 Arrangements for cooling or ventilating (channels or ducts in parts of the magnetic circuit H02K 1/20, H02K 1/32; channels or ducts in or between conductors H02K 3/22, H02K 3/24)
9/02 . by ambient air flowing through the machine
9/04 . . having means for generating a flow of cooling medium
9/06 . . . with fans or impellers driven by the machine shaft
9/08 . by gaseous cooling medium circulating wholly within the machine casing (H02K 9/10 takes precedence)
9/10 . by gaseous cooling medium flowing in closed circuit, a part of which is external to the machine casing
9/12 . . wherein the cooling medium circulates freely within the casing
9/14 . wherein gaseous cooling medium circulates between the machine casing and a surrounding mantle
9/16 . . wherein the cooling medium circulates through ducts or tubes within the casing
9/18 . . wherein the external part of the closed circuit comprises a heat exchanger structurally associated with the machine casing
9/19 . for machines with closed casing and closed-circuit cooling using a liquid cooling medium, e.g. oil
9/193 . . with provision for replenishing the cooling medium; with means for preventing leakage of the cooling medium
9/197 . . in which the rotor or stator space is fluid-tight, e.g. to provide for different cooling media for rotor and stator
9/20 . . wherein the cooling medium vaporises within the machine casing
9/22 . by solid heat conducting material embedded in, or arranged in contact with, the stator or rotor, e.g. heat bridges
9/223 . . {Heat bridges}
9/225 . . {Heat pipes}
9/227 . . {Heat sinks}
9/24 . Protection against failure of cooling arrangements, e.g. due to loss of cooling medium or due to interruption of the circulation of cooling medium
9/26 . Structural association of machines with devices for cleaning or drying cooling medium, e.g. with filters
9/28 . Cooling of commutators, slip-rings or brushes e.g. by ventilating

11/00 Structural association of dynamo-electric machines with electric components or with devices for shielding, monitoring or protection (casings, enclosures or supports H02K 5/00)
11/0094 . {Structural association with other electrical or electronic devices}
11/01 . for shielding from electromagnetic fields {, i.e. structural association with shields} (means for preventing or reducing eddy-current losses in the winding heads by shielding H02K 3/42)
11/012 . . {Shields associated with rotating parts, e.g. rotor cores or rotary shafts}
11/014 . . {Shields associated with stationary parts, e.g. stator cores}
11/0141 . . . {Shields associated with casings, enclosures or brackets}
11/02 . for suppression of electromagnetic interference
11/026 . . Suppressors associated with brushes, brush holders or their supports
11/028 . . Suppressors associated with the rotor
11/04 . for rectification
11/042 . . Rectifiers associated with rotating parts, e.g. rotor cores or rotary shafts
11/049 . . Rectifiers associated with stationary parts, e.g. stator cores
11/05 . . . Rectifiers associated with casings, enclosures or brackets
11/20 . for measuring, monitoring, testing, protecting or switching (rectifiers H02K 11/04; power electronics H02K 11/33)

11/21 . . Devices for sensing speed or position, or actuated thereby (specially adapted for machines having non-mechanical commutating devices H02K 29/06, H02K 29/14)
11/215 . . . Magnetic effect devices, e.g. Hall-effect or magneto-resistive elements
11/22 . . . Optical devices
11/225 . . . Detecting coils
11/23 . . . Mechanically-actuated centrifugal switches
11/24 . . Devices for sensing torque, or actuated thereby (H02K 11/27 takes precedence)
11/25 . . Devices for sensing temperature, or actuated thereby
11/26 . . Devices for sensing voltage, or actuated thereby, e.g. overvoltage protection devices
11/27 . . Devices for sensing current, or actuated thereby (overcurrent protection responsive to temperature of the machines or parts thereof, e.g. windings, H02K 11/25)
11/28 . . Manual switches
11/30 . Structural association with control circuits or drive circuits
11/33 . . Drive circuits, e.g. power electronics (H02K 11/38 takes precedence)
11/35 . . Devices for recording or transmitting machine parameters, e.g. memory chips or radio transmitters for diagnosis
11/38 . . Control circuits or drive circuits associated with geared commutator motors of the worm-and-wheel type
11/40 . Structural association with grounding devices

13/00 Structural associations of current collectors with motors or generators, e.g. brush mounting plates or connections to windings (supporting or protecting brushes or brush holders in motor casings or enclosures H02K 5/14)**; Disposition of current collectors in motors or generators; Arrangements for improving commutation**

13/003 . {Structural associations of slip-rings}
13/006 . {Structural associations of commutators}
13/02 . Connections between slip-rings and windings
13/04 . Connections between commutator segments and windings
13/06 . . Resistive connections, e.g. by high-resistance chokes or by transistors
13/08 . . Segments formed by extensions of the winding
13/10 . Arrangements of brushes or commutators specially adapted for improving commutation
13/105 . . {Spark suppressors associated with the commutator}
13/12 . Arrangements for producing an axial reciprocation of the rotor and its associated current collector part, e.g. for polishing commutator surfaces
13/14 . Circuit arrangements for improvement of commutation, e.g. by use of unidirectionally conductive elements

15/00 Methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing of dynamo-electric machines

15/0006 . {Disassembling, repairing or modifying dynamo-electric machines (repairing of cooling fluid boxes H02K 15/0093)}
15/0012 . {Manufacturing cage rotors}
15/0018 . {Applying slot closure means in the core; Manufacture of slot closure means}
15/0025 . {Shaping or compacting conductors or winding heads after the installation of the winding in the core or machine (methods or apparatus for simultaneously twisting a plurality of hairpins prior to mounting H02K 15/0428); Applying fastening means on winding heads}
15/0031 . . {Shaping or compacting conductors in slots or around salient poles (H02K 15/005 takes precedence)}
15/0037 . . {Shaping or compacting winding heads (H02K 15/005, H02K 15/0087 and H02K 15/0428 take precedence)}
15/0043 . . . {Applying fastening means on winding headS (fastening by applying resin, glue, varnish and similar means H02K 15/12)}
15/005 . . {by means of electrodynamic forces}
15/0056 . {Manufacturing winding connections}
15/0062 . . {Manufacturing the terminal arrangement per se; Connecting the terminals to an external circuit}
15/0068 . . {Connecting winding sections; Forming leads; Connecting leads to terminals}
15/0081 . . . {for form-wound windings}
15/0087 . . . . {characterised by the method or apparatus for simultaneously twisting a plurality of hairpins open ends after insertion into the machine (for simultaneously twisting a plurality of hairpins prior to mounting into the machine H02K 15/0428)}
15/0093 . . . . {Manufacturing or repairing cooling fluid boxes, i.e. terminals of fluid cooled windings ensuring both electrical and fluid connection}
15/02 . of stator or rotor bodies
15/022 . . {with salient poles or claw-shaped poles}
15/024 . . {with slots}
15/026 . . . {Wound cores}
15/028 . . . {for fastening to casing or support, respectively to shaft or hub}
15/03 . . having permanent magnets
15/04 . of windings, prior to mounting into machines (insulating windings H02K 15/10, H02K 15/12)
15/0407 . . {Windings manufactured by etching, printing or stamping the complete coil}
15/0414 . . {Windings consisting of separate elements, e.g. bars, hairpins, segments, half coils}
15/0421 . . . {consisting of single conductors, e.g. hairpins}
15/0428 . . . . {characterised by the method or apparatus for simultaneously twisting a plurality of hairpins (for simultaneously twisting a plurality of hairpins open ends after insertion into the machine H02K 15/0087)}
15/0435 . . {Wound windings}
15/0442 . . . {Loop windings (manufacturing of windings consisting of overlapped loops H02K 15/0464)}
15/045 . . . . {Form wound coils}
15/0464 . . . {Lap windings (when on diagonally wound hollow coils H02K 15/0492)}
15/0471 . . . . {manufactured by flattening a spiral winding}

15/0478 . . . {Wave windings, undulated windings (when on diagonally wound hollow coils H02K 15/0492)}
15/0485 . . . . {manufactured by shaping an annular winding}
15/0492 . . . {Diagonally wound hollow coils}
15/06 . Embedding prefabricated windings in machines
15/061 . . {Air-gap windings}
15/062 . . {Windings in slots; salient pole windings}
15/063 . . . {Windings for large electric machines, e.g. bar windings (windings consisting of cables H02K 15/065)}
15/064 . . . {Windings consisting of separate segments, e.g. hairpin windings (H02K 15/063 takes precedence)}
15/065 . . . {Windings consisting of complete sections, e.g. coils, waves (windings for large electric machines other than those consisting of cables H02K 15/063)}
15/066 . . . . {inserted perpendicularly to the axis of the slots or inter-polar channels}
15/067 . . . . {inserted in parallel to the axis of the slots or inter-polar channels}
15/068 . . . . . {Strippers}
15/08 . Forming windings by laying conductors into or around core parts
15/085 . . by laying conductors into slotted stators
15/09 . . by laying conductors into slotted rotors
15/095 . . by laying conductors around salient poles
15/10 . Applying solid insulation to windings, stators or rotors
15/105 . . {to the windings}
15/12 . Impregnating, heating or drying of windings, stators, rotors or machines
15/125 . . {Heating or drying of machines in operational state, e.g. standstill heating}
15/14 . Casings; Enclosures; Supports
15/16 . Centering rotors within the stator; Balancing rotors
15/165 . . {Balancing the rotor}

16/00 Machines with more than one rotor or stator **{**(machines for transmitting mechanical power from a driving shaft to a driven shaft and comprising structurally interrelated motor and generator parts H02K 51/00; permanent magnet machines with multiple rotors or stators relatively rotated for vectorially combining the excitation fields or the armature voltages H02K 21/029)**}**

16/005 . {Machines with only rotors, e.g. counter-rotating rotors (DC commutator machines or universal AC/DC commutator motors having a rotating armature and a rotating excitation field H02K 23/60)}
16/02 . Machines with one stator and two {or more} rotors
16/025 . . {with rotors and moving stators connected in a cascade (cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter H02K 17/34)}
16/04 . Machines with one rotor and two stators

17/00 Asynchronous induction motors; Asynchronous induction generators

17/02 . Asynchronous induction motors
17/04 . . for single phase current
17/06 . . . having windings arranged for permitting pole-changing
17/08 . . . Motors with auxiliary phase obtained by externally fed auxiliary windings, e.g. capacitor motors
17/10 . . . Motors with auxiliary phase obtained by split-pole carrying short-circuited windings
17/12 . . for multi-phase current
17/14 . . . having windings arranged for permitting pole-changing
17/16 . . having rotors with internally short-circuited windings, e.g. cage rotors

WARNING

Groups H02K 17/16, H02K 17/168, H02K 17/18 and H02K 17/20 are incomplete pending reclassification of documents from group H02K 17/165.

All groups listed in this Warning should be considered in order to perform a complete search.

17/165 *(Frozen)* . . . {characterised by the squirrel-cage or other short-circuited windings}

WARNING

Group H02K 17/165 is no longer used for the classification of documents as of May 1, 2023.

The content of this group is being reclassified into groups H02K 17/16, H02K 17/168, H02K 17/18 and H02K 17/20.

All groups listed in this Warning should be considered in order to perform a complete search.

17/168 . . . {having single-cage rotors}
17/18 . . . having double-cage or multiple-cage rotors
17/20 . . . having deep-bar rotors
17/22 . . having rotors with windings connected to slip-rings
17/24 . . . in which both stator and rotor are fed with AC
17/26 . . having rotors or stators designed to permit synchronous operation
17/28 . . having compensating winding for improving phase angle
17/30 . . Structural association of asynchronous induction motors with auxiliary electric devices influencing the characteristics of the motor or controlling the motor, e.g. with impedances or switches
17/32 . . Structural association of asynchronous induction motors with auxiliary mechanical devices, e.g. with clutches or brakes
17/34 . . Cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter
17/36 . . . with another asynchronous induction motor
17/38 . . . with a commutator machine
17/40 . . . with a rotary AC/DC converter
17/42 . Asynchronous induction generators (H02K 17/02 takes precedence)
17/44 . . Structural association with exciting machines

19/00 Synchronous motors or generators (having permanent magnets H02K 21/00)

19/02 . Synchronous motors
19/04 . . for single-phase current

19/06 . . . Motors having windings on the stator and a variable-reluctance soft-iron rotor without windings, e.g. inductor motors
19/08 . . . Motors having windings on the stator and a smooth rotor without windings of material with large hysteresis, e.g. hysteresis motors
19/10 . . for multi-phase current
19/103 . . . {Motors having windings on the stator and a variable reluctance soft-iron rotor without windings}
19/106 . . . {Motors having windings in the stator and a smooth rotor of material with large hysteresis without windings}
19/12 . . . characterised by the arrangement of exciting windings, e.g. for self-excitation, compounding or pole-changing
19/14 . . having additional short-circuited windings for starting as asynchronous motors
19/16 . Synchronous generators
19/18 . . having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar generators
19/20 . . . with variable-reluctance soft-iron rotors without winding
19/22 . . having windings each turn of which co-operates alternately with poles of opposite polarity, e.g. heteropolar generators
19/24 . . . with variable-reluctance soft-iron rotors without winding
19/26 . . characterised by the arrangement of exciting windings
19/28 . . . for self-excitation
19/30 . . . for compounding
19/32 . . . for pole-changing
19/34 . . Generators with two or more outputs
19/36 . . Structural association of synchronous generators with auxiliary electric devices influencing the characteristic of the generator or controlling the generator, e.g. with impedances or switches
19/365 . . . {with a voltage regulator}
19/38 . . Structural association of synchronous generators with exciting machines

21/00 Synchronous motors having permanent magnets; Synchronous generators having permanent magnets

21/02 . Details
21/021 . . {Means for mechanical adjustment of the excitation flux}
21/022 . . . {by modifying the relative position between field and armature, e.g. between rotor and stator (vectorial combination of field or armature sections H02K 21/029)}
21/023 . . . . {by varying the amount of superposition, i.e. the overlap, of field and armature}
21/024 . . . . . {Radial air gap machines}
21/025 . . . . {by varying the thickness of the air gap between field and armature}
21/026 . . . . . {Axial air gap machines}
21/027 . . . . . {Conical air gap machines}
21/028 . . . {by modifying the magnetic circuit within the field or the armature, e.g. by using shunts, by adjusting the magnets position, by vectorial combination of field or armature sections}
21/029 . . . . {Vectorial combination of the fluxes generated by a plurality of field sections or of the voltages induced in a plurality of armature sections}
21/04 . . Windings on magnets for additional excitation {; Windings and magnets for additional excitation}
21/042 . . . {with permanent magnets and field winding both rotating}
21/044 . . . . {Rotor of the claw pole type}
21/046 . . . {with rotating permanent magnets and stationary field winding}
21/048 . . . . {Rotor of the claw pole type}
21/10 . . Rotating armatures
21/12 . with stationary armatures and rotating magnets
21/125 . . {having an annular armature coil (H02K 21/14 - H02K 21/24 take precedence)}
21/14 . . with magnets rotating within the armatures
21/145 . . . {having an annular armature coil (with homopolar co-operation H02K 21/20)}
21/16 . . . having annular armature cores with salient poles (with homopolar co-operation H02K 21/20)
21/18 . . . having horse-shoe armature cores (with homopolar co-operation H02K 21/20)
21/185 . . . . {with the axis of the rotor perpendicular to the plane of the armature}
21/20 . . . having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar machine
21/22 . . with magnets rotating around the armatures, e.g. flywheel magnetos
21/222 . . . {Flywheel magnetos}
21/225 . . . . {having I-shaped, E-shaped or similarly shaped armature cores}
21/227 . . . {having an annular armature coil}
21/24 . . with magnets axially facing the armatures, e.g. hub-type cycle dynamos
21/26 . with rotating armatures and stationary magnets
21/28 . . with armatures rotating within the magnets
21/30 . . . having annular armature cores with salient poles (with homopolar co-operation H02K 21/36)
21/32 . . . having horse-shoe magnets (with homopolar co-operation H02K 21/36)
21/325 . . . . {with the axis of the rotating armature perpendicular to the plane of the magnet}
21/34 . . . having bell-shaped or bar-shaped magnets, e.g. for cycle lighting (with homopolar co-operation H02K 21/36)
21/36 . . . with homopolar co-operation
21/38 . with rotating flux distributors, and armatures and magnets both stationary
21/40 . . with flux distributors rotating around the magnets and within the armatures
21/42 . . with flux distributors rotating around the armatures and within the magnets
21/44 . . with armature windings wound upon the magnets
21/46 . Motors having additional short-circuited winding for starting as an asynchronous motor
21/48 . Generators with two or more outputs

23/00 DC commutator motors or generators having mechanical commutator; Universal AC/DC commutator motors

23/02 . characterised by arrangement for exciting
23/023 . . {having short-circuited brushes}
23/026 . . {having an unregular distribution of the exciting winding or of the excitation over the poles}
23/04 . . having permanent magnet excitation
23/06 . . having shunt connection of excitation windings
23/08 . . having series connection of excitation windings
23/10 . . having compound connection of excitation windings
23/12 . . having excitation produced by current sources independent of the armature circuit
23/14 . . having high-speed excitation or de-excitation, e.g. by neutralising the remanent excitation field
23/16 . . having angularly adjustable excitation field, e.g. by pole reversing or pole switching
23/18 . . having displaceable main or auxiliary brushes
23/20 . . having additional brushes spaced intermediately of the main brushes on the commutator, e.g. cross-field machines, metadynes, amplidynes or other armature-reaction excited machines
23/22 . . having compensating or damping windings
23/24 . . having commutating-pole windings
23/26 . characterised by the armature windings
23/28 . . having open windings, i.e. not closed within the armatures
23/30 . . having lap or loop windings
23/32 . . having wave or undulating windings
23/34 . . having mixed windings
23/36 . . having two or more windings; having two or more commutators; having two or more stators
23/38 . . having winding or connection for improving commutation, e.g. equipotential connection
23/40 . characterised by the arrangement of the magnet circuits
23/405 . . {Machines with a special form of the pole shoes}
23/42 . . having split poles, i.e. zones for varying reluctance by gaps in poles or by poles with different spacing of the air gap
23/44 . . having movable, e.g. turnable, iron parts
23/46 . . having stationary shunts, i.e. magnetic cross flux
23/48 . . having adjustable armatures
23/50 . Generators with two or more outputs
23/52 . Motors acting also as generators, e.g. starting motors used as generators for ignition or lighting
23/54 . Disc armature motors or generators
23/56 . Motors or generators having iron cores separated from armature winding
23/58 . Motors or generators without iron cores
23/60 . Motors or generators having rotating armatures and rotating excitation field
23/62 . Motors or generators with stationary armatures and rotating excitation field
23/64 . Motors specially adapted for running on DC or AC by choice
23/66 . Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the machine, e.g. with impedances or switches
23/68 . Structural association with auxiliary mechanical devices, e.g. with clutches or brakes

24/00 Machines adapted for the instantaneous transmission or reception of the angular displacement of rotating parts, e.g. synchro, selsyn

25/00 DC interrupter motors or generators

26/00 Machines adapted to function as torque motors, i.e. to exert a torque when stalled

27/00 AC commutator motors or generators having mechanical commutator

27/02 . characterised by the armature winding
27/04 . having single-phase operation in series or shunt connection
27/06 . . with a single or multiple short-circuited commutator, e.g. repulsion motor
27/08 . . with multiple-fed armature
27/10 . . with switching devices for different modes of operation, e.g. repulsion-induction motor
27/12 . having multi-phase operation
27/14 . . in series connection
27/16 . . in shunt connection with stator feeding
27/18 . . in shunt connection with rotor feeding
27/20 . Structural association with a speed regulating device
27/22 . having means for improving commutation, e.g. auxiliary fields, double windings, double brushes
27/24 . having two or more commutators
27/26 . having disc armature
27/28 . Structural association with auxiliary electric devices influencing the characteristic of the machine or controlling the machine
27/30 . Structural association with auxiliary mechanical devices, e.g. with clutches or brakes

29/00 Motors or generators having non-mechanical commutating devices, e.g. discharge tubes or semiconductor devices

29/03 . with a magnetic circuit specially adapted for avoiding torque ripples or self-starting problems
29/06 . with position sensing devices (H02K 29/03 takes precedence)
29/08 . . using magnetic effect devices, e.g. Hall-plates, magneto-resistors (H02K 29/12 takes precedence)
29/10 . . using light effect devices
29/12 . . using detecting coils {using the machine windings as detecting coil}
29/14 . with speed sensing devices (H02K 29/03 takes precedence)

31/00 Acyclic motors or generators, i.e. DC machines having drum or disc armatures with continuous current collectors

31/02 . with solid-contact collectors
31/04 . with at least one liquid-contact collector

33/00 Motors with reciprocating, oscillating or vibrating magnet, armature or coil system (arrangements for handling mechanical energy structurally associated with motors H02K 7/00, e.g. H02K 7/06)

33/02 . with armatures moved one way by energisation of a single coil system and returned by mechanical force, e.g. by springs
33/04 . . wherein the frequency of operation is determined by the frequency of uninterrupted AC energisation
33/06 . . . with polarised armatures
33/08 . . . with DC energisation superimposed on AC energisation

33/10 . . wherein the alternate energisation and de-energisation of the single coil system is effected or controlled by movement of the armatures
33/12 . with armatures moving in alternate directions by alternate energisation of two coil systems
33/14 . . wherein the alternate energisation and de-energisation of the two coil systems are effected or controlled by movement of the armatures
33/16 . with polarised armatures moving in alternate directions by reversal or energisation of a single coil system
33/18 . with coil systems moving upon intermittent or reversed energisation thereof by interaction with a fixed field system, e.g. permanent magnets

35/00 Generators with reciprocating, oscillating or vibrating coil system, magnet, armature or other part of the magnetic circuit (arrangements for handling mechanical energy structurally associated with generators H02K 7/00, e.g. H02K 7/06)
35/02 . with moving magnets and stationary coil systems
35/04 . with moving coil systems and stationary magnets
35/06 . with moving flux distributors, and both coil systems and magnets stationary

37/00 Motors with rotor rotating step by step and without interrupter or commutator driven by the rotor, e.g. stepping motors
37/02 . of variable reluctance type
37/04 . . with rotors situated within the stators
37/06 . . with rotors situated around the stators
37/08 . . with rotors axially facing the stators
37/10 . of permanent magnet type (H02K 37/02 takes precedence)
37/12 . . with stationary armatures and rotating magnets
37/125 . . . {Magnet axially facing armature}
37/14 . . . with magnets rotating within the armatures
37/16 . . . . having horseshoe armature cores
37/18 . . . . of homopolar type
37/20 . . with rotating flux distributors, the armatures and magnets both being stationary
37/22 . Damping units
37/24 . Structural association with auxiliary mechanical devices

39/00 Generators specially adapted for producing a desired non-sinusoidal waveform

41/00 Propulsion systems in which a rigid body is moved along a path due to dynamo-electric interaction between the body and a magnetic field travelling along the path {(electromagnetic launchers F41B 6/00)**}**
41/02 . Linear motors; Sectional motors
41/025 . . Asynchronous motors
41/03 . . Synchronous motors; Motors moving step by step; Reluctance motors (H02K 41/035 takes precedence)
41/031 . . . {of the permanent magnet type}
41/033 . . . . {with armature and magnets on one member, the other member being a flux distributor}
41/035 . . DC motors; Unipolar motors
41/0352 . . . {Unipolar motors}
41/0354 . . . . {Lorentz force motors, e.g. voice coil motors}
41/0356 . . . . . {moving along a straight path}
41/0358 . . . . . {moving along a curvilinear path}
41/06 . Rolling motors, i.e. motors having the rotor axis parallel to the stator axis and following a circular path as the rotor rolls around the inside or outside of the stator {; Nutating motors, i.e. having the rotor axis parallel to the stator axis inclined with respect to the stator axis and performing a nutational movement as the rotor rolls on the stator}
41/065 . . {Nutating motors}

44/00 Machines in which the dynamo-electric interaction between a plasma or flow of conductive liquid or of fluid-borne conductive or magnetic particles and a coil system or magnetic field converts energy of mass flow into electrical energy or vice versa
44/02 . Electrodynamic pumps
44/04 . . Conduction pumps
44/06 . . Induction pumps
44/08 . Magnetohydrodynamic [MHD] generators
44/085 . . {with conducting liquids}
44/10 . . Constructional details of electrodes
44/12 . . Constructional details of fluid channels
44/14 . . . Circular or screw-shaped channels
44/16 . . Constructional details of the magnetic circuits
44/18 . . for generating AC power
44/20 . . . by changing the polarity of the magnetic field
44/22 . . . by changing the conductivity of the fluid
44/24 . . . by reversing the direction of fluid
44/26 . . . by creating a travelling magnetic field
44/28 . Association of MHD generators with conventional generators (nuclear power plants including a MHD generator G21D 7/02)

47/00 Dynamo-electric converters
47/02 . AC/DC converters or vice versa
47/04 . . Motor/generators
47/06 . . Cascade converters
47/08 . . Single-armature converters
47/10 . . . with booster machines on the AC side
47/12 . DC/DC converters
47/14 . . Motor/generators
47/16 . . Single-armature converters, e.g. metadyne
47/18 . AC/AC converters
47/20 . . Motor/generators
47/22 . . Single-armature frequency converters with or without phase-number conversion
47/24 . . . having windings for different numbers of poles
47/26 . . . operating as under- or over-synchronously running asynchronous induction machines, e.g. cascade arrangement of asynchronous and synchronous machines
47/28 . . . operating as commutator machines with added slip-rings
47/30 . . Single-armature phase-number converters without frequency conversion

49/00 Dynamo-electric clutches; Dynamo-electric brakes
49/02 . of the asynchronous induction type
49/04 . . of the eddy-current hysteresis type
49/043 . . . {with a radial airgap}
49/046 . . . {with an axial airgap}
49/06 . of the synchronous type {(H02K 49/10 takes precedence)}
49/065 . . {hysteresis type}

49/08 . of the collector armature type
49/10 . of the permanent-magnet type
49/102 . . {Magnetic gearings, i.e. assembly of gears, linear or rotary, by which motion is magnetically transferred without physical contact (magnetized gearings with physical contact F16H 13/12, F16H 49/005)}
49/104 . . {Magnetic couplings consisting of only two coaxial rotary elements, i.e. the driving element and the driven element}
49/106 . . . {with a radial air gap}
49/108 . . . {with an axial air gap}
49/12 . of the acyclic type

51/00 Dynamo-electric gears, i.e. dynamo-electric means for transmitting mechanical power from a driving shaft to a driven shaft and comprising structurally interrelated motor and generator parts

53/00 Alleged dynamo-electric perpetua mobilia

55/00 Dynamo-electric machines having windings operating at cryogenic temperatures

55/02 . of the synchronous type
55/04 . . with rotating field windings
55/06 . of the homopolar type

99/00 Subject matter not provided for in other groups of this subclass

99/10 . {Generators}
99/20 . {Motors}

2201/00 Specific aspects not provided for in the other groups of this subclass relating to the magnetic circuits

2201/03 . Machines characterised by aspects of the air-gap between rotor and stator
2201/06 . Magnetic cores, or permanent magnets characterised by their skew
2201/09 . Magnetic cores comprising laminations characterised by being fastened by caulking
2201/12 . Transversal flux machines
2201/15 . Sectional machines
2201/18 . Machines moving with multiple degrees of freedom

2203/00 Specific aspects not provided for in the other groups of this subclass relating to the windings

2203/03 . Machines characterised by the wiring boards, i.e. printed circuit boards or similar structures for connecting the winding terminations
2203/06 . Machines characterised by the wiring leads, i.e. conducting wires for connecting the winding terminations
2203/09 . Machines characterised by wiring elements other than wires, e.g. bus rings, for connecting the winding terminations
2203/12 . Machines characterised by the bobbins for supporting the windings
2203/15 . Machines characterised by cable windings, e.g. high-voltage cables, ribbon cables

2205/00 Specific aspects not provided for in the other groups of this subclass relating to casings, enclosures, supports

2205/03 . Machines characterised by thrust bearings
2205/06 . Machines characterised by means for keeping the brushes in a retracted position during assembly
2205/09 . Machines characterised by drain passages or by venting, breathing or pressure compensating means
2205/12 . Machines characterised by means for reducing windage losses or windage noise

2207/00 Specific aspects not provided for in the other groups of this subclass relating to arrangements for handling mechanical energy

2207/03 . Tubular motors, i.e. rotary motors mounted inside a tube, e.g. for blinds

2209/00 Specific aspects not provided for in the other groups of this subclass relating to systems for cooling or ventilating

2211/00 Specific aspects not provided for in the other groups of this subclass relating to measuring or protective devices or electric components

2211/03 . Machines characterised by circuit boards, e.g. pcb

2213/00 Specific aspects, not otherwise provided for and not covered by codes H02K 2201/00 - H02K 2211/00

2213/03 . Machines characterised by numerical values, ranges, mathematical expressions or similar information
2213/06 . Machines characterised by the presence of fail safe, back up, redundant or other similar emergency arrangements
2213/09 . Machines characterised by the presence of elements which are subject to variation, e.g. adjustable bearings, reconfigurable windings, variable pitch ventilators
2213/12 . Machines characterised by the modularity of some components

2215/00 Specific aspects not provided for in other groups of this subclass relating to methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing of dynamo-electric machines