

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 are 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.

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|-------------|---|--------|---|
| 1/00 | Details of the magnetic circuit (magnetic circuits for relays H01H 50/16) | 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)} |
| 1/02 | . 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 | 1/24 | . . . Rotor cores with salient poles {; Variable reluctance rotors} |
| 1/10 | . . . Commutating poles | 1/243 | {of the claw-pole type} |
| 1/12 | . . Stationary parts of the magnetic circuit | 1/246 | {Variable reluctance rotors} |
| 1/14 | . . . Stator cores with salient poles | 1/26 | . . . Rotor cores with slots for windings |
| 1/141 | {consisting of C-shaped cores} | 1/265 | {Shape, form or location of the slots} |
| 1/143 | {of the horse-shoe type} | 1/27 | . . . Rotor cores with permanent magnets |
| 1/145 | {having an annular coil, e.g. of the claw-pole type} | 1/2706 | {Inner rotor} |
| 1/146 | {consisting of a generally annular yoke with salient poles} | 1/2713 | {where the magnetisation axis of the magnets is axial} |
| 1/148 | {Sectional cores (H02K 1/141 takes precedence)} | 1/272 | {where the magnetisation axis of the magnets is radial or tangential} |
| 1/16 | . . . Stator cores with slots for windings | 1/2726 | {consisting of a single magnet or of a plurality of axially juxtaposed single magnets} |
| 1/165 | {Shape, form or location of the slots} | | |
| 1/17 | . . . Stator cores with permanent magnets | 1/2733 | {Annular magnets} |
| 1/18 | . . . Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures | 1/274 | {consisting of a plurality of circumferentially positioned magnets} |
| 1/182 | {to stators axially facing the rotor, i.e. with axial or conical air gap} | 1/2746 | {consisting of magnets arranged with the same polarity} |
| 1/185 | {to outer stators} | 1/2753 | {consisting of magnets or groups of magnets arranged with alternating polarity} |
| 1/187 | {to inner stators} | | |
| 1/20 | . . . with channels or ducts for flow of cooling medium | 1/276 | {Magnets embedded in the magnetic core} |
| 1/22 | . . Rotating parts of the magnetic circuit | 1/2766 | {having a flux concentration effect} |
| | | 1/2773 | {consisting of tangentially magnetized radial magnets} |

| | | | |
|-------------|--|-------------|---|
| 1/278 | {Surface mounted magnets; Inset magnets} | 3/521 | . . . {applicable to stators only} |
| 1/2786 | {Outer rotor} | 3/522 | {for generally annular cores with salient poles} |
| 1/2793 | {Rotor axially facing stator} | 3/524 | {for U-shaped, E-shaped or similarly shaped cores} |
| 1/28 | . . . Means for mounting or fastening rotating magnetic parts on to, or to, the rotor structures | 3/525 | {Annular coils, e.g. for cores of the claw-pole type} |
| 1/30 | using intermediate parts, e.g. spiders | 3/527 | . . . {applicable to rotors only} |
| 1/32 | . . . with channels or ducts for flow of cooling medium | 3/528 | {of the claw-pole type} |
| 1/325 | {between salient poles} | 5/00 | Casings; Enclosures; Supports |
| 1/34 | . . Reciprocating, oscillating or vibrating parts of the magnetic circuit | 5/02 | . Casings or enclosures characterised by the material thereof |
| 3/00 | Details of windings | 5/04 | . Casings or enclosures characterised by the shape, form or construction thereof |
| 3/02 | . Windings characterised by the conductor material | 5/06 | . . Cast metal casings |
| 3/04 | . Windings characterised by the conductor shape, form or construction, e.g. with bar conductors | 5/08 | . . Insulating casings |
| 3/12 | . . arranged in slots | 5/10 | . . with arrangements for protection from ingress, e.g. water or fingers |
| 3/14 | . . . with transposed conductors, e.g. twisted conductors | 5/12 | . . specially adapted for operating in liquid or gas (combined with cooling arrangements H02K 9/00) |
| 3/16 | . . . for auxiliary purposes, e.g. damping or commutating | 5/124 | . . . Sealing of shafts |
| 3/18 | . . Windings for salient poles | 5/128 | . . . using air-gap sleeves or air-gap discs |
| 3/20 | . . . for auxiliary purposes, e.g. damping or commutating | 5/1282 | {the partition wall in the air-gap being non cylindrical} |
| 3/22 | . . consisting of hollow conductors | 5/1285 | {of the submersible type} |
| 3/24 | . . with channels or ducts for cooling medium between the conductors | 5/132 | . . . Submersible electric motors (H02K 5/128 takes precedence) |
| 3/26 | . . consisting of printed conductors | 5/136 | . . . explosion-proof |
| 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) | 5/14 | . . Means for supporting or protecting brushes or brush holders |
| 3/30 | . Windings characterised by the insulating material | 5/141 | . . . {for cooperation with slip-rings} |
| 3/32 | . Windings characterised by the shape, form or construction of the insulation | 5/143 | . . . {for cooperation with commutators} |
| 3/325 | . . {for windings on salient poles, such as claw-shaped poles} | 5/145 | {Fixedly supported brushes or brush holders, e.g. leaf or leaf-mounted brushes} |
| 3/34 | . . between conductors or between conductor and core, e.g. slot insulation | 5/146 | {Pivotaly supported brushes or brush holders} |
| 3/345 | . . . {between conductor and core, e.g. slot insulation} | 5/148 | {Slidably supported brushes} |
| 3/38 | . . around winding heads, equalising connectors, or connections thereto | 5/15 | . . Mounting arrangements for bearing-shields or end plates |
| 3/40 | . . for high voltage, e.g. affording protection against corona discharges | 5/16 | . . Means for supporting bearings, e.g. insulating supports or means for fitting bearings in the bearing-shields (magnetic bearings H02K 7/09) |
| 3/42 | . Means for preventing or reducing eddy-current losses in the winding heads, e.g. by shielding | 5/161 | . . . {radially supporting the rotary shaft at both ends of the rotor (H02K 5/165 , H02K 5/167 , H02K 5/173 take precedence)} |
| 3/44 | . Protection against moisture or chemical attack; Windings specially adapted for operation in liquid or gas | 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)} |
| 3/46 | . Fastening of windings on the stator or rotor structure | 5/165 | . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly (H02K 5/167 , H02K 5/173 take precedence)} |
| 3/47 | . . Air-gap windings, i.e. iron-free windings | 5/167 | . . . using sliding-contact or spherical cap bearings |
| 3/48 | . . in slots | 5/1672 | {radially supporting the rotary shaft at both ends of the rotor (H02K 5/1677 takes precedence)} |
| 3/487 | . . . Slot-closing devices | 5/1675 | {radially supporting the rotary shaft at only one end of the rotor (H02K 5/1677 takes precedence)} |
| 3/493 | magnetic | 5/1677 | {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly} |
| 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 | | |

- 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
- WARNING**
- Group [H02K 5/20](#) is impacted by reclassification into groups [H02K 5/203](#) and [H02K 5/207](#).
- Groups [H02K 5/20](#), [H02K 5/203](#), and [H02K 5/207](#) should be considered in order to perform a complete search.
- 5/203 . . . {specially adapted for liquids, e.g. cooling jackets}
- WARNING**
- Group [H02K 5/203](#) is incomplete pending reclassification of documents from group [H02K 5/20](#).
- Groups [H02K 5/20](#) and [H02K 5/203](#) should be considered in order to perform a complete search.
- 5/207 . . . {with openings in the casing specially adapted for ambient air}
- WARNING**
- Group [H02K 5/207](#) is incomplete pending reclassification of documents from group [H02K 5/20](#).
- Groups [H02K 5/20](#) and [H02K 5/207](#) should be considered in order to perform a complete search.
- 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
- WARNING**
Group [H02K 9/20](#) is impacted by reclassification into group [H02K 9/225](#).
Groups [H02K 9/20](#) and [H02K 9/225](#) should be considered in order to perform a complete search.
- 9/22 . by solid heat conducting material embedded in, or arranged in contact with, the stator or rotor, e.g. heat bridges
- WARNING**
Group [H02K 9/22](#) is impacted by reclassification into groups [H02K 9/223](#), [H02K 9/225](#), and [H02K 9/227](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 9/223 . . {Heat bridges}
- WARNING**
Group [H02K 9/223](#) is incomplete pending reclassification of documents from group [H02K 9/22](#).
Groups [H02K 9/22](#) and [H02K 9/223](#) should be considered in order to perform a complete search.
- 9/225 . . {Heat pipes}
- WARNING**
Group [H02K 9/225](#) is incomplete pending reclassification of documents from groups [H02K 9/20](#) and [H02K 9/22](#).
Groups [H02K 9/20](#), [H02K 9/22](#), and [H02K 9/225](#) should be considered in order to perform a complete search.

- 9/227 . . {Heat sinks}
- WARNING**
- Group [H02K 9/227](#) is incomplete pending reclassification of documents from group [H02K 9/22](#).
- Groups [H02K 9/22](#) and [H02K 9/227](#) should be considered in order to perform a complete search.
- 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](#))
- WARNING**
- Group [H02K 11/01](#) is incomplete pending reclassification of documents from group [H02K 11/022](#).
- Group [H02K 11/01](#) is also impacted by reclassification into groups [H02K 11/012](#), [H02K 11/014](#), and [H02K 11/0141](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 11/012 . . {Shields associated with rotating parts, e.g. rotor cores or rotary shafts}
- WARNING**
- Group [H02K 11/012](#) is incomplete pending reclassification of documents from groups [H02K 11/01](#) and [H02K 11/022](#).
- Groups [H02K 11/01](#), [H02K 11/022](#) and [H02K 11/012](#) should be considered in order to perform a complete search.
- 11/014 . . {Shields associated with stationary parts, e.g. stator cores}
- WARNING**
- Group [H02K 11/014](#) is incomplete pending reclassification of documents from groups [H02K 11/01](#) and [H02K 11/022](#).
- Groups [H02K 11/01](#), [H02K 11/022](#) and [H02K 11/014](#) should be considered in order to perform a complete search.
- 11/0141 . . . {Shields associated with casings, enclosures or brackets}
- WARNING**
- Group [H02K 11/0141](#) is incomplete pending reclassification of documents from groups [H02K 11/01](#) and [H02K 11/022](#).
- Groups [H02K 11/01](#), [H02K 11/022](#) and [H02K 11/0141](#) should be considered in order to perform a complete search.
- 11/02 . for suppression of electromagnetic interference
- 11/022 . . {Shields}
- (Frozen)
- WARNING**
- Group [H02K 11/022](#) is no longer used for the classification of documents as of August 1, 2020).
- The content of this group is being reclassified into groups [H02K 11/01](#)-[H02K 11/0141](#).
- Groups [H02K 11/022](#) and [H02K 11/01](#) - [H02K 11/0141](#) should be considered in order to perform a complete search.
- 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
- 11/044 . . {in motors ([H02K 11/042](#) takes precedence)}
- 11/046 . . {in generators ([H02K 11/042](#) takes precedence)}
- 11/048 . . . {Rectifiers combined with drive circuits in starter-generators}
- 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
- 17/165 . . . {characterised by the squirrel-cage or other short-circuited windings}
- 17/18 . . . having double-cage or multiple-cage rotors
- 17/185 {characterised by the double- or multiple cage windings}
- 17/20 . . . having deep-bar rotors
- 17/205 {characterised by the deep-bar windings}
- 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

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| 23/52 | • Motors acting also as generators, e.g. starting motors used as generators for ignition or lighting | 29/14 | • with speed sensing devices (H02K 29/03 takes precedence) |
| 23/54 | • Disc armature motors or generators | 31/00 | Acyclic motors or generators, i.e. DC machines having drum or disc armatures with continuous current collectors |
| 23/56 | • Motors or generators having iron cores separated from armature winding | 31/02 | • with solid-contact collectors |
| 23/58 | • Motors or generators without iron cores | 31/04 | • with at least one liquid-contact collector |
| 23/60 | • Motors or generators having rotating armatures and rotating excitation field | 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) |
| 23/62 | • Motors or generators with stationary armatures and rotating excitation field | 33/02 | • with armatures moved one way by energisation of a single coil system and returned by mechanical force, e.g. by springs |
| 23/64 | • Motors specially adapted for running on DC or AC by choice | 33/04 | • . wherein the frequency of operation is determined by the frequency of uninterrupted AC energisation |
| 23/66 | • Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the machine, e.g. with impedances or switches | 33/06 | • . . . with polarised armatures |
| 23/68 | • Structural association with auxiliary mechanical devices, e.g. with clutches or brakes | 33/08 | • . . . with DC energisation superimposed on AC energisation |
| 24/00 | Machines adapted for the instantaneous transmission or reception of the angular displacement of rotating parts, e.g. synchro, selsyn | 33/10 | • . wherein the alternate energisation and de-energisation of the single coil system is effected or controlled by movement of the armatures |
| 25/00 | DC interrupter motors or generators | 33/12 | • with armatures moving in alternate directions by alternate energisation of two coil systems |
| 26/00 | Machines adapted to function as torque motors, i.e. to exert a torque when stalled | 33/14 | • . wherein the alternate energisation and de-energisation of the two coil systems are effected or controlled by movement of the armatures |
| 27/00 | AC commutator motors or generators having mechanical commutator | 33/16 | • with polarised armatures moving in alternate directions by reversal or energisation of a single coil system |
| 27/02 | • characterised by the armature winding | 33/18 | • with coil systems moving upon intermittent or reversed energisation thereof by interaction with a fixed field system, e.g. permanent magnets |
| 27/04 | • having single-phase operation in series or shunt connection | 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) |
| 27/06 | • . with a single or multiple short-circuited commutator, e.g. repulsion motor | 35/02 | • with moving magnets and stationary coil systems |
| 27/08 | • . with multiple-fed armature | 35/04 | • with moving coil systems and stationary magnets |
| 27/10 | • . with switching devices for different modes of operation, e.g. repulsion-induction motor | 35/06 | • with moving flux distributors, and both coil systems and magnets stationary |
| 27/12 | • having multi-phase operation | 37/00 | Motors with rotor rotating step by step and without interrupter or commutator driven by the rotor, e.g. stepping motors |
| 27/14 | • . in series connection | 37/02 | • of variable reluctance type |
| 27/16 | • . in shunt connection with stator feeding | 37/04 | • . with rotors situated within the stators |
| 27/18 | • . in shunt connection with rotor feeding | 37/06 | • . with rotors situated around the stators |
| 27/20 | • Structural association with a speed regulating device | 37/08 | • . with rotors axially facing the stators |
| 27/22 | • having means for improving commutation, e.g. auxiliary fields, double windings, double brushes | 37/10 | • of permanent magnet type (H02K 37/02 takes precedence) |
| 27/24 | • having two or more commutators | 37/12 | • . with stationary armatures and rotating magnets |
| 27/26 | • having disc armature | 37/125 | • . . {Magnet axially facing armature} |
| 27/28 | • Structural association with auxiliary electric devices influencing the characteristic of the machine or controlling the machine | 37/14 | • . . with magnets rotating within the armatures |
| 27/30 | • Structural association with auxiliary mechanical devices, e.g. with clutches or brakes | 37/16 | • . . . having horseshoe armature cores |
| 29/00 | Motors or generators having non-mechanical commutating devices, e.g. discharge tubes or semiconductor devices | 37/18 | • . . . of homopolar type |
| 29/03 | • with a magnetic circuit specially adapted for avoiding torque ripples or self-starting problems | 37/20 | • . with rotating flux distributors, the armatures and magnets both being stationary |
| 29/06 | • with position sensing devices (H02K 29/03 takes precedence) | 37/22 | • Damping units |
| 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 } | | |

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| 37/24 | . Structural association with auxiliary mechanical devices | 47/16 | . . Single-armature converters, e.g. metadyne |
| 39/00 | Generators specially adapted for producing a desired non-sinusoidal waveform | 47/18 | . AC/AC converters |
| 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)} | 47/20 | . . Motor/generators |
| 41/02 | . Linear motors; Sectional motors | 47/22 | . . Single-armature frequency converters with or without phase-number conversion |
| 41/025 | . . Asynchronous motors | 47/24 | . . . having windings for different numbers of poles |
| 41/03 | . . Synchronous motors; Motors moving step by step; Reluctance motors (H02K 41/035 takes precedence) | 47/26 | . . . operating as under- or over-synchronously running asynchronous induction machines, e.g. cascade arrangement of asynchronous and synchronous machines |
| 41/031 | . . . {of the permanent magnet type} | 47/28 | . . . operating as commutator machines with added slip-rings |
| 41/033 | {with armature and magnets on one member, the other member being a flux distributor} | 47/30 | . . Single-armature phase-number converters without frequency conversion |
| 41/035 | . . DC motors; Unipolar motors | 49/00 | Dynamo-electric clutches; Dynamo-electric brakes |
| 41/0352 | . . . {Unipolar motors} | 49/02 | . of the asynchronous induction type |
| 41/0354 | {Lorentz force motors, e.g. voice coil motors} | 49/04 | . . of the eddy-current hysteresis type |
| 41/0356 | {moving along a straight path} | 49/043 | . . . {with a radial airgap} |
| 41/0358 | {moving along a curvilinear path} | 49/046 | . . . {with an axial airgap} |
| 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} | 49/06 | . of the synchronous type {(H02K 49/10 takes precedence)} |
| 41/065 | . . {Nutating motors} | 49/065 | . . {hysteresis type} |
| 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 | 49/08 | . of the collector armature type |
| 44/02 | . Electrodynamic pumps | 49/10 | . of the permanent-magnet type |
| 44/04 | . . Conduction pumps | 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)} |
| 44/06 | . . Induction pumps | 49/104 | . . {Magnetic couplings consisting of only two coaxial rotary elements, i.e. the driving element and the driven element} |
| 44/08 | . Magnetohydrodynamic [MHD] generators | 49/106 | . . . {with a radial air gap} |
| 44/085 | . . {with conducting liquids} | 49/108 | . . . {with an axial air gap} |
| 44/10 | . . Constructional details of electrodes | 49/12 | . of the acyclic type |
| 44/12 | . . Constructional details of fluid channels | 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 |
| 44/14 | . . . Circular or screw-shaped channels | 53/00 | Alleged dynamo-electric perpetua mobilia |
| 44/16 | . . Constructional details of the magnetic circuits | 55/00 | Dynamo-electric machines having windings operating at cryogenic temperatures |
| 44/18 | . . for generating AC power | 55/02 | . of the synchronous type |
| 44/20 | . . . by changing the polarity of the magnetic field | 55/04 | . . with rotating field windings |
| 44/22 | . . . by changing the conductivity of the fluid | 55/06 | . of the homopolar type |
| 44/24 | . . . by reversing the direction of fluid | 99/00 | Subject matter not provided for in other groups of this subclass |
| 44/26 | . . . by creating a travelling magnetic field | 99/10 | . {Generators} |
| 44/28 | . Association of MHD generators with conventional generators (nuclear power plants including a MHD generator G21D 7/02) | 99/20 | . {Motors} |
| 47/00 | Dynamo-electric converters | 2201/00 | Specific aspects not provided for in the other groups of this subclass relating to the magnetic circuits |
| 47/02 | . AC/DC converters or vice versa | 2201/03 | . Machines characterised by aspects of the air-gap between rotor and stator |
| 47/04 | . . Motor/generators | 2201/06 | . Magnetic cores, or permanent magnets characterised by their skew |
| 47/06 | . . Cascade converters | 2201/09 | . Magnetic cores comprising laminations characterised by being fastened by caulking |
| 47/08 | . . Single-armature converters | 2201/12 | . Transversal flux machines |
| 47/10 | . . . with booster machines on the AC side | 2201/15 | . Sectional machines |
| 47/12 | . DC/DC converters | | |
| 47/14 | . . Motor/generators | | |

- 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