CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 BASIC ELECTRIC ELEMENTS

(NOTE omitted)

H01F MAGNETS; INDUCTANCES; TRANSFORMERS; SELECTION OF MATERIALS FOR THEIR MAGNETIC PROPERTIES (ceramics based on ferrites C04B 35/26; alloys C22C; {construction of loading coils H01B} ; thermomagnetic devices H01L 37/00; loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers H04R)

NOTE

In this subclass, inductances and transformers are regarded as being "for power supply" if they are intended for this purpose even in systems operating at frequencies above 60 cycles/sec.

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 Magnets or magnetic bodies characterised by the magnetic materials therefor; Selection of materials for their magnetic properties

1/0009 . {Antiferromagnetic materials, i.e. materials exhibiting a Néel transition temperature (H01F 1/0036 takes precedence)}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 1/00 - H01F 1/447

1/0018 . {Diamagnetic or paramagnetic materials, i.e. materials with low susceptibility and no hysteresis (H01F 1/0036 takes precedence)}

1/0027 . {Thick magnetic films (forming thick magnetic films H01F 41/16; magnetic record carriers G11B 5/70)}

NOTE

Group H01F 1/0036 takes precedence over groups H01F 1/09, H01F 1/11, H01F 1/20, H01F 1/33 and H01F 1/36

1/0036 . {showing low dimensional magnetism, i.e. spin rearrangements due to a restriction of dimensions, e.g. showing giant magnetoresistivity, (H01F 1/153, H01F 1/42 and H01F 10/00 take precedence; magnetoresistive sensors G01D 5/16, G01R 33/06; magnetoresistive recording G11B 5/39; magnetic-field-controlled resistors H01L 43/08)}

1/0045 . . {Zero dimensional, e.g. nanoparticles, soft nanoparticles for medical/biological use (preparation of fullerenes in general C01B 32/15)}

1/0054 . . . {Coated nanoparticles, e.g. nanoparticles coated with organic surfactant}

1/0063 . . . {in a non-magnetic matrix, e.g. granular solids (granular films H01F 10/007)}

1/0072 . . {one dimensional, i.e. linear or dendritic nanostructures}

1/0081 . . . {in a non-magnetic matrix, e.g. Fe-nanowires in a nanoporous membrane}

1/009 . . {bidimensional, e.g. nanoscale period nanomagnet arrays (H01F 10/007 takes precedence)}

1/01 . of inorganic materials (H01F 1/44 takes precedence)

1/012 . . {adapted for magnetic entropy change by magnetocaloric effect, e.g. used as magnetic refrigerating material (refrigeration systems using magnetic effects F25B 21/00)}

1/015 . . . {Metals or alloys}

1/017 . . . {Compounds}

1/03 . . characterised by their coercivity {(H01F 1/40 takes precedence)}

1/0302 . . . {characterised by unspecified or heterogeneous hardness or specially adapted for magnetic hardness transitions}

1/0304 . . . . {adapted for large Barkhausen jumps or domain wall rotations, e.g. WIEGAND or MATTEUCCI effect (H01F 1/143 and H01F 1/15391 take precedence)}

1/0306 . . . . {Metals or alloys, e.g. LAVES phase alloys of the $MgCu_2$-type (H01F 1/0304 takes precedence)}

1/0308 . . . . . {with magnetic shape memory [MSM], i.e. with lattice transformations driven by a magnetic field, e.g. Heusler alloys}

1/0311 . . . . {Compounds (H01F 1/0304 takes precedence)}

1/0313 . . . . . {Oxidic compounds}

1/0315 . . . . . {Ferrites}

1/0317 . . . . . {Manganites}

1/032 . . . of hard-magnetic materials

1/04 . . . . metals or alloys

1/047 . . . . . Alloys characterised by their composition

NOTE

In groups H01F 1/053 - H01F 1/059, an alloy is classified in the last appropriate place

1/053 . . . . . containing rare earth metals
1/0533 . . . . . {in a bonding agent}
1/0536 . . . . . {sintered}
1/055 . . . . . and magnetic transition metals, e.g. $SmCo_5$
1/0551 . . . . . {in the form of particles, e.g. rapid quenched powders or ribbon flakes}
1/0552 . . . . . {with a protective layer}
1/0553 . . . . . {obtained by reduction or by hydrogen decrepitation or embrittlement}
1/0555 . . . . . {pressed, sintered or bonded together}
1/0556 . . . . . {pressed}
1/0557 . . . . . {sintered}
1/0558 . . . . . {bonded together}
1/057 . . . . . and IIIa elements, e.g. $Nd_2Fe_{14}B$
1/0571 . . . . . {in the form of particles, e.g. rapid quenched powders or ribbon flakes}
1/0572 . . . . . {with a protective layer}
1/0573 . . . . . {obtained by reduction or by hydrogen decrepitation or embrittlement}
1/0574 . . . . . {obtained by liquid dynamic compaction}
1/0575 . . . . . {pressed, sintered or bonded together}
1/0576 . . . . . {pressed, e.g. hot working}
1/0577 . . . . . {sintered}
1/0578 . . . . . {bonded together}
1/0579 . . . . . {with exchange spin coupling between hard and soft nanophases, e.g. nanocomposite spring magnets}
1/058 . . . . . and IVa elements, e.g. $Gd_2Fe_{14}C$
1/059 . . . . . and Va elements, e.g. $Sm_2Fe_{17}N_2$
1/0593 . . . . . {of tetragonal $ThMn_{12}$-structure}
1/0596 . . . . . {of rhombic or rhombohedral Th_2Zn_{17} structure or hexagonal Th_2Ni_{17} structure}
1/06 . . . . . in the form of particles, e.g. powder (H01F 1/047 takes precedence {; record carriers G11B 5/70605})
1/061 . . . . . {with a protective layer}
1/063 . . . . . {with a non magnetic core}
1/065 . . . . . {obtained by a reduction}
1/066 . . . . . {obtained by liquid dynamic compaction}
1/068 . . . . . {having a L10 crystallographic structure, e.g. [Co,Fe][Pt,Pd] (nano)particles}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 1/06 - H01F 1/066

1/08 . . . . . pressed, sintered, or bound together
1/083 . . . . . {in a bonding agent}
1/086 . . . . . {sintered}
1/09 . . . . mixtures of metallic and non-metallic particles; metallic particles having oxide skin
1/10 . . . . non-metallic substances, e.g. ferrites {, e.g. $[(Ba,Sr)O(Fe_2O_3)_6]$ ferrites with hexagonal structure}
1/11 . . . . . in the form of particles {(for magnetic record carriers G11B 5/70626)}
1/111 . . . . . {with a non-magnetic core}
1/112 . . . . . {with a skin (H01F 1/113 takes precedence)}
1/113 . . . . . in a bonding agent
1/117 . . . . . Flexible bodies
1/12 . . . of soft-magnetic materials
1/14 . . . . metals or alloys
1/143 . . . . . {in the form of wires (H01F 1/147 takes precedence)}
1/147 . . . . . Alloys characterised by their composition {(treatment thereof for enhancing their electromagnetic properties C21D 8/12)}

NOTE

In groups H01F 1/14708 - H01F 1/15391, an alloy is classified in the last appropriate place

1/14708 . . . . . {Fe-Ni based alloys (pure Fe or Ni H01F 1/14, H01F 1/16 or H01F 1/20)}
1/14716 . . . . . {in the form of sheets}
1/14725 . . . . . {with insulating coating}
1/14733 . . . . . {in the form of particles}
1/14741 . . . . . {pressed, sintered or bonded together}
1/1475 . . . . . {the particles being insulated}
1/14758 . . . . . {by macromolecular organic substances}
1/14766 . . . . . {Fe-Si based alloys}
1/14775 . . . . . {in the form of sheets}
1/14783 . . . . . {with insulating coating}
1/14791 . . . . . {Fe-Si-Al based alloys, e.g. Sendust}
1/153 . . . . . Amorphous metallic alloys, e.g. glassy metals {(making ferrous amorphous alloys C22C 33/003)}
1/15308 . . . . . {based on Fe/Ni (H01F 1/15325 takes precedence)}
1/15316 . . . . . {based on Co (H01F 1/15325 takes precedence)}
1/15325 . . . . . {containing rare earths}
1/15333 . . . . . {containing nanocrystallites, e.g. obtained by annealing}
1/15341 . . . . . {Preparation processes therefor}

1/1535 . . . . . {by powder metallurgy, e.g. spark erosion}
1/15358 . . . . . {Making agglomerates therefrom, e.g. by pressing}
1/15366 . . . . . {using a binder}
1/15375 . . . . . {using polymers}
1/15383 . . . . . {Applying coatings thereon (H01F 1/15366 takes precedence)}
1/15391 . . . . . {Elongated structures, e.g. wires}
1/16 . . . . . in the form of sheets (H01F 1/147 takes precedence)
1/18 . . . . . with insulating coating
1/20 . . . . . in the form of particles, e.g. powder (H01F 1/147 takes precedence)
1/22 . . . . . pressed, sintered, or bound together
1/24 . . . . . the particles being insulated
1/26 . . . . . by macromolecular organic substances
1/28 . . . . . dispersed or suspended in a bonding agent
1/33 . . . . mixtures of metallic and non-metallic particles; metallic particles having oxide skin
1/34 . . . . non-metallic substances, e.g. ferrites
1/342 . . . . . {Oxides (H01F 1/36 and H01F 1/38 take precedence)}
1/344 . . . . . {Ferrites, e.g. having a cubic spinel structure (X2+O)(Y23+O3), e.g. magnetite Fe_3O_4}
1/346 . . . . . {[(TO4) 3] with T= Si, Al, Fe, Ga (H01F 10/24 takes precedence; Faraday rotators G02F 1/09)}
1/348 . . . . . {Hexaferrites with decreased hardness or anisotropy, i.e. with increased permeability in the microwave (GHz) range, e.g. having a hexagonal crystallographic structure}
1/36 . . . . . in the form of particles {(H01F 1/346, H01F 1/348 and H01F 1/38 take precedence)}
1/37 . . . . . in a bonding agent
1/375 . . . . . Flexible bodies
1/38 . . . . . amorphous, e.g. amorphous oxides
1/40 . . of magnetic semiconductor materials, e.g. $CdCr_2S_4$ (devices using galvano-magnetic or similar effects H01L 43/00)
1/401 . . . {diluted}

NOTE

In group H01F 1/401, a diluted magnetic semiconductor (DMS) is classified in the last appropriate place

1/402 . . . . {of II-VI type, e.g. Zn1-x Crx Se}
1/404 . . . . {of III-V type, e.g. In1-x Mnx As}
1/405 . . . . {of IV type, e.g. Ge1-xMnx}
1/407 . . . . {Diluted non-magnetic ions in a magnetic cation-sublattice, e.g. perovskites, La1-x(Ba,Sr)xMnO3}
1/408 . . . {half-metallic, i.e. having only one electronic spin direction at the Fermi level, e.g. CrO_2, Heusler alloys (H01F 10/1936 takes precedence)}
1/42 . of organic or organo-metallic materials {, e.g. graphene} (H01F 1/44 takes precedence)
1/44 . of magnetic liquids, e.g. ferrofluids (particles in a bonding agent H01F 1/28, H01F 1/36, {H01F 1/37})
1/442 . . {the magnetic component being a metal or alloy, e.g. Fe (H01F 1/447 takes precedence)}
1/445 . . {the magnetic component being a compound, e.g. Fe_3O_4 (H01F 1/447 takes precedence)}
1/447 . . {characterised by magnetoviscosity, e.g. magnetorheological, magnetothixotropic, magnetodilatant liquids (electrorheological fluids C10M 171/001)}

3/00 **Cores, Yokes, or armatures** (magnetic materials H01F 1/00; permanent magnets H01F 7/02)
2003/005 . {Magnetic cores for receiving several windings with perpendicular axes, e.g. for antennae or inductive power transfer}
3/02 . made from sheets
3/04 . made from strips or ribbons
3/06 . made from wires
3/08 . made from powder (powder coatings on sheets H01F 3/02; on strips or ribbons H01F 3/04; on wires H01F 3/06)
3/10 . Composite arrangements of magnetic circuits
2003/103 . . {Magnetic circuits with permanent magnets}
2003/106 . . {Magnetic circuits using combinations of different magnetic materials}
3/12 . . Magnetic shunt paths
3/14 . . Constrictions; Gaps, e.g. air-gaps (in magnetic shunt paths H01F 3/12)

5/00 **Coils** (superconducting coils H01F 6/06; fixed inductances of the signal type H01F 17/00)
5/003 . {Printed circuit coils}
2005/006 . {with conical spiral form}
5/02 . wound on non-magnetic supports, e.g. formers
2005/022 . . {wound on formers with several winding chambers separated by flanges, e.g. for high voltage applications}
2005/025 . . {wound on coaxial arrangement of two or more formers}
2005/027 . . {wound on formers for receiving several coils with perpendicular winding axes, e.g. for antennae or inductive power transfer}
5/04 . Arrangements of electric connections to coils, e.g. leads
2005/043 . . {having multiple pin terminals, e.g. arranged in two parallel lines at both sides of the coil}
2005/046 . . {Details of formers and pin terminals related to mounting on printed circuits}
5/06 . Insulation of windings

6/00 **Superconducting magnets; Superconducting coils {**(magnetic resonance assemblies using superconducting coil systems G01R 33/3815)**}**
2006/001 . {Constructive details of inductive current limiters}
6/003 . {Methods and means for discharging superconductive storage (superconducting alloys C22C; static memories with superconducting elements G11C 11/44; superconducting circuit breakers with contacts H01H 33/004; superconducting material H01L 39/00; power cryotons H01L 39/20; superconducting switches for low power H03K 17/92)}

6/005 . {Methods and means for increasing the stored energy in superconductive coils by increments (flux pumps)}
6/006 . {Supplying energising or de-energising current; Flux pumps}
6/008 . . {Electric circuit arrangements for energising superconductive electromagnets}
6/02 . Quenching; Protection arrangements during quenching {(protection circuits H02H 7/001)}
6/04 . Cooling
6/06 . Coils, e.g. winding, insulating, terminating or casing arrangements therefor
6/065 . . {Feed-through bushings, terminals and joints (leading of conductors or axles through casings of transformers H01F 27/04)}

7/00 **Magnets** (superconducting magnets H01F 6/00; for separation of solid materials or fluids B03C 1/00; for bench or like work-holders B23B 31/28, B23Q 3/00; work-holding devices B25B 11/00; lifting magnets B66C 1/00; {operating or controlling locks using permanent magnets E05B 47/0038; devices for holding a wing, e.g. door or window, by magnetic or electromagnetic attraction E05C 19/16; relieving load or bearings using magnetic means F16C 39/06} ; for electric meters G01R; for relays H01H; {for electric discharge tubes H01J, e.g. H01J 3/24, H01J 23/10, H01J 29/68} ; for dynamo-electric machines H02K)
7/02 . Permanent magnets {[PM]}
7/0205 . . {Magnetic circuits with PM in general}
7/021 . . . {Construction of PM (H01F 7/0278 takes precedence; PM compositions H01F 1/032)}
7/0215 . . . . {Flexible forms, sheets}
7/0221 . . . {Mounting means for PM, supporting, coating, encapsulating PM}
7/0226 . . . {PM with variable field strength (H01F 7/0284 takes precedence)}
7/0231 . . {Magnetic circuits with PM for power or force generation}
7/0236 . . . {Magnetic suspension or levitation (for vehicles B60L 13/04; magnetic bearings F16C 39/063)}
7/0242 . . . {Magnetic drives, magnetic coupling devices}
7/0247 . . . {Orientating, locating, transporting arrangements}
7/0252 . . . {PM holding devices (H01F 7/021, H01F 7/0215, H01F 7/0226 take precedence)}
7/0257 . . . . {Lifting, pick-up magnetic objects}
7/0263 . . . . {Closures, bags, bands, engagement devices with male and female parts}
7/0268 . . . . {Magnetic cylinders}
7/0273 . . {Magnetic circuits with PM for magnetic field generation}
7/0278 . . . {for generating uniform fields, focusing, deflecting electrically charged particles (for magnetic separation by Lorentz force B03C 1/023; specially adapted for NMR applications G01R 33/383)}
7/0284 . . . . {using a trimmable or adjustable magnetic circuit, e.g. for a symmetric dipole or quadrupole magnetic field}
7/0289 . . . {Transducers, loudspeakers, moving coil arrangements}
7/0294 . . . {Detection, inspection, magnetic treatment}
7/04 . . Means for releasing the attractive force
7/06 . Electromagnets; Actuators including electromagnets {(electric coils H01F 5/00; devices for holding workpieces using electric force B23Q 3/15; load-engaging elements for lifting articles electromagnetically B66C 1/06; electromagnetic couplings F16D 27/00; magnetic brakes F16D 63/002; electromagnetically operated valves F16K 11/24, F16K 31/00; analysing materials by magnetic means G01N 27/72, G01N 27/80; electromagnets for winding mechanical clocks G04C 1/02; electromagnetic relays H01H 51/00; windings for salient poles of dynamo-electric machines H02K 3/18; electromagnets for telegraphic communication H04L; for arc lamps H05B 31/28)}
2007/062 . . {Details of terminals or connectors for electromagnets}
7/064 . . {Circuit arrangements for actuating electromagnets (circuit arrangements for obtaining special operating characteristics H01F 7/18; driving circuits for electromagnets making use of a switching regulator H01H 47/325)}
7/066 . . {Electromagnets with movable winding}
2007/068 . . {using printed circuit coils}
7/08 . . with armatures
7/081 . . . {Magnetic constructions}
2007/083 . . . . {External yoke surrounding the coil bobbin, e.g. made of bent magnetic sheet}
2007/085 . . . . {Yoke or polar piece between coil bobbin and armature having a gap, e.g. filled with nonmagnetic material}
2007/086 . . . . {Structural details of the armature}
7/088 . . . {provided with means for absorbing shocks}
7/10 . . . specially adapted for alternating current
7/11 . . . . reducing or eliminating the effects of eddy currents
7/12 . . . . having anti-chattering arrangements
7/1205 . . . . . {having short-circuited conductors (electromagnetic relays provided with short-circuited conducting sleeves H01H 47/00)}
7/121 . . . Guiding or setting position of armatures, e.g. retaining armatures in their end position
7/122 . . . . by permanent magnets {(H01F 7/1615, H01F 7/1646 take precedence)}
7/123 . . . . by ancillary coil
7/124 . . . . by mechanical latch, e.g. detent
7/126 . . . Supporting or mounting
7/127 . . . Assembling
7/128 . . . Encapsulating, encasing or sealing
7/129 . . . . of armatures
7/13 . . . characterised by pulling-force characteristics
7/14 . . . Pivoting armatures (H01F 7/17 takes precedence)
7/145 . . . . {Rotary electromagnets with variable gap (with fixed gap or torque motors H02K 26/00)}
7/16 . . . Rectilinearly-movable armatures (H01F 7/17 takes precedence)
7/1607 . . . . {Armatures entering the winding}
7/1615 . . . . . {Armatures or stationary parts of magnetic circuit having permanent magnet}
7/1623 . . . . . {Armatures having T-form}

2007/163 . . . . . {with axial bearing}
7/1638 . . . . {Armatures not entering the winding}
7/1646 . . . . . {Armatures or stationary parts of magnetic circuit having permanent magnet}
7/1653 . . . . {Magnetic circuit having axially spaced pole-pieces}
2007/1661 . . . . {Electromagnets or actuators with anti-stick disc}
2007/1669 . . . . {Armatures actuated by current pulse, e.g. bistable actuators}
2007/1676 . . . . {Means for avoiding or reducing eddy currents in the magnetic circuit, e.g. radial slots}
2007/1684 . . . . {Armature position measurement using coils}
2007/1692 . . . . {Electromagnets or actuators with two coils}
7/17 . . . Pivoting and rectilinearly-movable armatures
7/18 . . . Circuit arrangements for obtaining desired operating characteristics, e.g. for slow operation, for sequential energisation of windings, for high-speed energisation of windings
7/1805 . . . . {Circuit arrangements for holding the operation of electromagnets or for holding the armature in attracted position with reduced energising current (for holding relay armature in attracted position with reduced energising current H01H 47/04; quick energising of electro-dynamic machines H02P 9/08; for quickly de-energising of dynamo-electric generators H02P 9/123)}
7/1811 . . . . . {demagnetising upon switching off, removing residual magnetism}
7/1816 . . . . . {making use of an energy accumulator (for relays H01H 47/043)}
2007/1822 . . . . . {using a capacitor to produce a boost voltage}
7/1827 . . . . . {by changing number of serially-connected turns or windings (for relays H01H 47/06)}
7/1833 . . . . . {by changing number of parallel-connected turns or windings (for relays H01H 47/08)}
7/1838 . . . . . {by switching-in or -out impedance (for relays H01H 47/10)}
7/1844 . . . . {Monitoring or fail-safe circuits (for relays H01H 47/002)}
2007/185 . . . . . {with armature position measurement}
2007/1855 . . . . . {using a stored table to deduce one variable from another}
2007/1861 . . . . . {using derivative of measured variable}
2007/1866 . . . . . {with regulation loop}
7/1872 . . . . {Bistable or bidirectional current devices (relays H01H 47/226)}
7/1877 . . . . {controlling a plurality of loads}
7/1883 . . . . {by steepening leading and trailing edges of magnetisation pulse, e.g. printer drivers}
2007/1888 . . . . {using pulse width modulation}
2007/1894 . . . . {minimizing impact energy on closure of magnetic circuit}
7/20 . . without armatures (cores H01F 3/00; coils H01F 5/00 {; shaping metal by applying magnetic forces B21D 26/14; electromagnets specially adapted for NMR applications G01R 33/381})
7/202 . . . {Electromagnets for high magnetic field strength (for superconducting electromagnets H01F 6/00; for transformers or inductances without a magnetic core H01F 30/08)}
7/204 . . . . {Circuits for energising or de-energising}
7/206 . . . {Electromagnets for lifting, handling or transporting of magnetic pieces or material (electromagnets for guidance of vehicles, workpieces B65G 21/2009; for magnetic suspension or levitation H02N 15/00)}
2007/208 . . . . {combined with permanent magnets}

10/00 Thin magnetic films, e.g. of one-domain structure (magnetic record carriers G11B 5/00; thin-film magnetic stores G11C)

10/002 . {Antiferromagnetic thin films, i.e. films exhibiting a Néel transition temperature (H01F 10/3218 and H01F 10/3268 take precedence)}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/00 - H01F 10/30

10/005 . {organic or organo-metallic films, e.g. monomolecular films obtained by Langmuir-Blodgett technique, graphene}
10/007 . {ultrathin or granular films (H01F 10/005 and H01F 10/3227 take precedence; applying ultrathin or granular layers to substrates H01F 41/301)}
10/06 . characterised by the coupling or physical contact with connecting or interacting conductors
10/08 . characterised by magnetic layers ({H01F 10/32 takes precedence } ; applying thin magnetic films to substrates H01F 41/14)
10/10 . . characterised by the composition
10/12 . . . being metals or alloys (intermetallic compounds H01F 10/18)
10/123 . . . . {having a L10 crystallographic structure, e.g. [Co,Fe][Pt,Pd] thin films}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/16

10/126 . . . . {containing rare earth metals (H01F 10/133 takes precedence)}
10/13 . . . . Amorphous metallic alloys, e.g. glassy metals {(H01F 10/3204 takes precedence)}

NOTE

In this group, amorphous metallic alloys are classified in the last appropriate place

10/131 . . . . . {containing iron or nickel}
10/132 . . . . . {containing cobalt}
10/133 . . . . . {containing rare earth metals}
10/135 . . . . . {containing transition metals}
10/136 . . . . . {containing iron}
10/137 . . . . . {containing cobalt}
10/138 . . . . . {containing nanocrystallites, e.g. obtained by annealing}

10/14 . . . . containing iron or nickel ({H01F 10/126} , H01F 10/13, H01F 10/16 take precedence)

NOTE

In this group, alloys containing iron or nickel are classified in the last appropriate place

10/142 . . . . . {containing Si}
10/145 . . . . . {containing Al, e.g. SENDUST}
10/147 . . . . . {with lattice under strain, e.g. expanded by interstitial nitrogen (H01F 10/26 - H01F 10/30 take precedence)}
10/16 . . . . containing cobalt ({H01F 10/126} , H01F 10/13 take precedence)
10/18 . . . being compounds
10/187 . . . . Amorphous compounds {(H01F 10/3204 takes precedence)}
10/193 . . . . Magnetic semiconductor compounds {(in general H01F 1/40; multilayers, e.g. superlattices H01F 10/3213)}
10/1933 . . . . . {Perovskites}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/193

10/1936 . . . . . {Half-metallic, e.g. epitaxial CrO_2 or NiMnSb films}
10/20 . . . . Ferrites
10/205 . . . . . {Hexagonal ferrites}
10/22 . . . . . Orthoferrites {, e.g. $RFeO_3$ (R= rare earth element) with orthorhombic structure}
10/24 . . . . . Garnets {(in general H01F 1/346; multilayers, e.g. superlattices H01F 10/3209; applying magnetic garnet films to substrates by sputtering H01F 41/186)}
10/245 . . . . . {Modifications for enhancing interaction with electromagnetic wave energy}
10/26 . characterised by the substrate or intermediate layers {(H01F 10/06 and H01F 10/32 take precedence)}
10/265 . . {Magnetic multilayers non exchange-coupled (H01F 10/32 takes precedence)}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 10/00 - H01F 10/30

10/28 . . characterised by the composition of the substrate
10/30 . . characterised by the composition of the intermediate layers {, e.g. seed, buffer, template, diffusion preventing, cap layers (H01F 10/06 and H01F 10/32 take precedence)}
10/32 . Spin-exchange-coupled multilayers, e.g. nanostructured superlattices {(applying spin-exchange-coupled multilayers to substrates H01F 41/302)}
10/3204 . . {Exchange coupling of amorphous multilayers}
10/3209 . . {Exchange coupling of garnet multilayers}
10/3213 . . {Exchange coupling of magnetic semiconductor multilayers, e.g. MnSe/ZnSe superlattices (semiconductor materials for use in semiconductor devices H01L 29/12)}
10/3218 . . {Exchange coupling of magnetic films via an antiferromagnetic interface (H01F 10/3268 takes precedence)}
10/3222 . . {Exchange coupled hard/soft multilayers, e.g. CoPt/Co or NiFe/CoSm (nanocomposite spring magnets H01F 1/0579)}
10/3227 . . {Exchange coupling via one or more magnetisable ultrathin or granular films}
10/3231 . . . {via a non-magnetic spacer}
10/3236 . . . . {made of a noble metal, e.g.(Co/Pt) n multilayers having perpendicular anisotropy (H01F 10/3286 takes precedence)}
10/324 . . {Exchange coupling of magnetic film pairs via a very thin non-magnetic spacer, e.g. by exchange with conduction electrons of the spacer}
10/3245 . . . {the spacer being superconductive}
10/325 . . . {the spacer being noble metal}
10/3254 . . . {the spacer being semiconducting or insulating, e.g. for spin tunnel junction [STJ]}
10/3259 . . . . {Spin-exchange-coupled multilayers comprising at least a nanooxide layer [NOL], e.g. with a NOL spacer}
10/3263 . . . {the exchange coupling being symmetric, e.g. for dual spin valve, e.g. NiO/Co/Cu/Co/Cu/Co/NiO}
10/3268 . . . {the exchange coupling being asymmetric, e.g. by use of additional pinning, by using antiferromagnetic or ferromagnetic coupling interface, i.e. so-called spin-valve [SV] structure, e.g. NiFe/Cu/NiFe/FeMn}
10/3272 . . . . {by use of anti-parallel coupled [APC] ferromagnetic layers, e.g. artificial ferrimagnets [AFI], artificial [AAF] or synthetic [SAF] anti-ferromagnets}
10/3277 . . . . . {by use of artificial ferrimagnets [AFI] only}
10/3281 . . . . {only by use of asymmetry of the magnetic film pair itself, i.e. so-called pseudospin valve [PSV] structure, e.g. NiFe/Cu/Co}
10/3286 . . . {Spin-exchange coupled multilayers having at least one layer with perpendicular magnetic anisotropy}
10/329 . . . {Spin-exchange coupled multilayers wherein the magnetisation of the free layer is switched by a spin-polarised current, e.g. spin torque effect}
10/3295 . . . {Spin-exchange coupled multilayers wherein the magnetic pinned or free layers are laminated without anti-parallel coupling within the pinned and free layers}

13/00 **Apparatus or processes for magnetising or demagnetising** ({devices for holding workpieces using magnetic or electric force acting directly on the workpieces B23Q 3/15} ; for degaussing ships B63G 9/06; for clocks or watches G04D 9/00; {recording or erasing of information on magnetic record carriers G11B 5/00} ; demagnetising arrangements for colour television H04N 9/29)
13/003 . {Methods and devices for magnetising permanent magnets (permanent magnets H01F 7/02)}

13/006 . {Methods and devices for demagnetising of magnetic bodies, e.g. workpieces, sheet material (for erasing of information on magnetic record carriers G11B 5/00)}

17/00 Fixed inductances of the signal type (coils in general H01F 5/00 {inductors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof and multistep manufacturing processes therefor H01L 28/10})

17/0006 . {Printed inductances (printed coils for dynamo-electric machines H02K 3/26; printed circuits H05K)}

17/0013 . . {with stacked layers}

2017/002 . . . {Details of via holes for interconnecting the layers}

2017/0026 . . . {Multilayer LC-filter}

17/0033 . . {with the coil helically wound around a magnetic core}

2017/004 . . {with the coil helically wound around an axis without a core}

2017/0046 . . {with a conductive path having a bridge}

2017/0053 . . {with means to reduce eddy currents}

2017/006 . . {flexible printed inductors}

2017/0066 . . {with a magnetic layer}

2017/0073 . . {with a special conductive pattern, e.g. flat spiral}

2017/008 . . {Electric or magnetic shielding of printed inductances}

2017/0086 . . {on semiconductor substrate (inductors for integrated circuits H01L 28/10)}

2017/0093 . {Common mode choke coil}

17/02 . without magnetic core

17/03 . . with ceramic former

17/04 . with magnetic core

17/041 . . {Means for preventing rotation or displacement of the core}

17/043 . . {with two, usually identical or nearly identical parts enclosing completely the coil (pot cores)}

17/045 . . {with core of cylindric geometry and coil wound along its longitudinal axis, i.e. rod or drum core}

2017/046 . . . {helical coil made of flat wire, e.g. with smaller extension of wire cross section in the direction of the longitudinal axis}

2017/048 . . {with encapsulating core, e.g. made of resin and magnetic powder}

17/06 . . with core substantially closed in itself, e.g. toroid

17/062 . . . {Toroidal core with turns of coil around it}

2017/065 . . . {Core mounted around conductor to absorb noise, e.g. EMI filter}

2017/067 . . . {Core with two or more holes to lead through conductor}

17/08 . . . Loading coils for telecommunication circuits

19/00 Fixed transformers or mutual inductances of the signal type (H01F 36/00 takes precedence)

19/02 . Audio-frequency transformers or mutual inductances, i.e. not suitable for handling frequencies considerably beyond the audio range

19/04 . Transformers or mutual inductances suitable for handling frequencies considerably beyond the audio range (resonant circuits H03H)

19/06 . . Broad-band transformers, e.g. suitable for handling frequencies well down into the audio range

19/08 . . Transformers having magnetic bias, e.g. for handling pulses

2019/085 . . . {Transformer for galvanic isolation}

21/00 Variable inductances or transformers of the signal type (H01F 36/00 takes precedence)

21/005 . {Inductances without magnetic core}

21/02 . continuously variable, e.g. variometers

21/04 . . by relative movement of turns or parts of windings

21/06 . . by movement of core or part of core relative to the windings as a whole

21/065 . . . {Measures for obtaining a desired relation between the position of the core and the inductance}

21/08 . . by varying the permeability of the core, e.g. by varying magnetic bias

21/10 . . by means of a movable shield

21/12 . discontinuously variable, e.g. tapped

2021/125 . . {Printed variable inductor with taps, e.g. for VCO}

27/00 Details of transformers or inductances, in general

27/002 . {Arrangements provided on the transformer facilitating its transport}

27/004 . {Arrangements for interchanging inductances, transformers or coils thereof}

27/006 . {with special arrangement or spacing of turns of the winding(s), e.g. to produce desired self-resonance}

27/008 . {with temperature compensation}

27/02 . Casings

27/022 . . {Encapsulation}

27/025 . . {Constructional details relating to cooling}

27/027 . . {specially adapted for combination of signal type inductors or transformers with electronic circuits, e.g. mounting on printed circuit boards}

27/04 . . Leading of conductors or axles through casings, e.g. for tap-changing arrangements

27/06 . Mounting, supporting or suspending transformers, reactors or choke coils {not being of the signal type}

2027/065 . . {Mounting on printed circuit boards}

27/08 . Cooling (heat-transfer elements F28F); Ventilating (structural details of casings H01F 27/02)

27/085 . . {Cooling by ambient air}

27/10 . . Liquid cooling

27/105 . . . {Cooling by special liquid or by liquid of particular composition}

27/12 . . . Oil cooling

27/125 . . . . {Cooling by synthetic insulating and incombustible liquid}

27/14 . . . . Expansion chambers; Oil conservators; Gas cushions; Arrangements for purifying, drying, or filling

27/16 . . . Water cooling

27/18 . . . by evaporating liquids

27/20 . . Cooling by special gases or non-ambient air

27/22 . . Cooling by heat conduction through solid or powdered fillings

27/23 . Corrosion protection

27/24 . Magnetic cores

27/245 . . made from sheets, e.g. grain-oriented (H01F 27/26 takes precedence)

27/2455 . . . {using bent laminations}

27/25 . . made from strips or ribbons (H01F 27/26 takes precedence)
27/255 . . made from particles (H01F 27/26 takes precedence)
27/26 . . Fastening parts of the core together; Fastening or mounting the core on casing or support (on coil H01F 27/30)
27/263 . . . {Fastening parts of the core together}
27/266 . . . {Fastening or mounting the core on casing or support (on coil H01F 27/30)}
27/28 . Coils; Windings; Conductive connections
27/2804 . . {Printed windings}
2027/2809 . . . {on stacked layers}
2027/2814 . . . {with only part of the coil or of the winding in the printed circuit board, e.g. the remaining coil or winding sections can be made of wires or sheets}
2027/2819 . . . {Planar transformers with printed windings, e.g. surrounded by two cores and to be mounted on printed circuit}
27/2823 . . {Wires (H01F 27/2866 takes precedence)}
27/2828 . . . {Construction of conductive connections, of leads}
2027/2833 . . . {using coaxial cable as wire}
2027/2838 . . . {using transposed wires}
2027/2842 . . . {Wire coils wound in conical zigzag to reduce voltage between winding turns}
27/2847 . . {Sheets; Strips (H01F 27/2866 takes precedence)}
27/2852 . . . {Construction of conductive connections, of leads}
2027/2857 . . . {Coil formed from wound foil conductor}
2027/2861 . . . {Coil formed by folding a blank}
27/2866 . . {Combination of wires and sheets}
27/2871 . . {Pancake coils}
27/2876 . . {Cooling (cooling transformers and inductances in general H01F 27/08)}
27/288 . . {Shielding}
27/2885 . . . {with shields or electrodes (shields or electrodes for pancake coils H01F 27/2871; construction of electric or magnetic shields or screens H01F 27/36)}
27/289 . . . {with auxiliary windings (for pancake coils H01F 27/2871)}
27/2895 . . {Windings disposed upon ring cores}
27/29 . . Terminals; Tapping arrangements {for signal inductances}
27/292 . . . {Surface mounted devices}
2027/295 . . . . {with flexible terminals}
2027/297 . . . {with pin-like terminal to be inserted in hole of printed path}
27/30 . . Fastening or clamping coils, windings, or parts thereof together; Fastening or mounting coils or windings on core, casing, or other support
27/303 . . . {Clamping coils, windings or parts thereof together}
27/306 . . . {Fastening or mounting coils or windings on core, casing or other support}
27/32 . . Insulating of coils, windings, or parts thereof
27/321 . . . {using a fluid for insulating purposes only}
27/322 . . . {the insulation forming channels for circulation of the fluid}
27/323 . . . {Insulation between winding turns, between winding layers}
27/324 . . . {Insulation between coil and core, between different winding sections, around the coil; Other insulation structures}
27/325 . . . . {Coil bobbins (formers for coils in general H01F 5/02)}
27/326 . . . . {specifically adapted for discharge lamp ballasts}
27/327 . . . {Encapsulating or impregnating (encapsulating coil and core H01F 27/022)}
2027/328 . . . . {Dry-type transformer with encapsulated foil winding, e.g. windings coaxially arranged on core legs with spacers for cooling and with three phases}
2027/329 . . . {Insulation with semiconducting layer, e.g. to reduce corona effect}
27/33 . Arrangements for noise damping
27/34 . Special means for preventing or reducing unwanted electric or magnetic effects, e.g. no-load losses, reactive currents, harmonics, oscillations, leakage fields
27/341 . . {Preventing or reducing no-load losses or reactive currents}
27/343 . . {Preventing or reducing surge voltages; oscillations}
27/345 . . . {using auxiliary conductors}
27/346 . . {Preventing or reducing leakage fields (using magnetic shields H01F 27/365; using auxiliary windings H01F 27/38)}
2027/348 . . {Preventing eddy currents}
27/36 . . Electric or magnetic shields or screens (movable for varying inductance H01F 21/10)
27/362 . . . {Electric shields or screens}
27/365 . . . {Magnetic shields or screens}
27/367 . . . . {using non-magnetic screens}
27/38 . . Auxiliary core members; Auxiliary coils or windings
27/385 . . . {for reducing harmonics}
27/40 . Structural association with built-in electric component, e.g. fuse
27/402 . . {Association of measuring or protective means}
2027/404 . . . {Protective devices specially adapted for fluid filled transformers}
2027/406 . . . {Temperature sensor or protection}
2027/408 . . {Association with diode or rectifier}
27/42 . Circuits specially adapted for the purpose of modifying, or compensating for, electric characteristics of transformers, reactors, or choke coils (circuits for controlling transformers, reactors or choke coils, for the purpose of obtaining a desired output H02P 13/00; impedance networks H03H)
27/422 . . {for instrument transformers}
27/425 . . . {for voltage transformers}
27/427 . . . {for current transformers}

29/00 Variable transformers or inductances not covered by group H01F 21/00 {(tap change devices H01H 9/0005)}

29/02 . with tappings on coil or winding; with provision for rearrangement or interconnection of windings
29/025 . . {Constructional details of transformers or reactors with tapping on coil or windings}
29/04 . . having provision for tap-changing without interrupting the load current

29/06 . with current collector gliding or rolling on or along winding
29/08 . with core, coil, winding, or shield movable to offset variation of voltage or phase shift, e.g. induction regulators
29/10 . . having movable part of magnetic circuit {(high leakage transformers H01F 38/08; dynamo-electric machines with movable part of magnetic circuit H02K 23/44, H02K 23/48)}
29/12 . . having movable coil, winding, or part thereof; having movable shield
29/14 . with variable magnetic bias ({amplitude modulation by means of variable impedance element H03C 1/08} ; magnetic amplifiers H03F; {circuits for automatic telephonic communication H04M 3/00})
2029/143 . . {with control winding for generating magnetic bias}
29/146 . . {Constructional details}

30/00 Fixed transformers not covered by group H01F 19/00

30/02 . Auto-transformers
30/04 . having two or more secondary windings, each supplying a separate load, e.g. for radio set power supplies
30/06 . characterised by the structure
30/08 . . without magnetic core
30/10 . . Single-phase transformers (H01F 30/16 takes precedence)
30/12 . . Two-phase, three-phase or polyphase transformers
30/14 . . . for changing the number of phases
30/16 . . Toroidal transformers

36/00 Transformers with superconductive windings or with windings operating at cryogenic temperature (superconducting magnets or superconducting coils H01F 6/00)

37/00 Fixed inductances not covered by group H01F 17/00

37/005 . {without magnetic core}

38/00 Adaptations of transformers or inductances for specific applications or functions

2038/003 . {High frequency transformer for microwave oven}
2038/006 . {matrix transformer consisting of several interconnected individual transformers working as a whole}
38/02 . for non-linear operation
38/023 . . {of inductances}
2038/026 . . . {non-linear inductive arrangements for converters, e.g. with additional windings}
38/04 . . for frequency changing
38/06 . . for changing the wave shape
38/08 . High-leakage transformers or inductances
38/085 . . {Welding transformers}
38/10 . . Ballasts, e.g. for discharge lamps
38/12 . Ignition, e.g. for IC engines
2038/122 . . {with rod-shaped core}
2038/125 . . {with oil insulation}
2038/127 . . {with magnetic circuit including permanent magnet}
38/14 . Inductive couplings {(for charging batteries from ac mains by converters H02J 7/025)}
2038/143 . . {for signals}
2038/146 . . {in combination with capacitive coupling}
38/16 . Cascade transformers, e.g. for use with extra high tension
38/18 . Rotary transformers
38/20 . Instruments transformers
38/22 . . for single phase ac
38/24 . . . Voltage transformers
38/26 . . . . Constructions
38/28 . . . Current transformers
38/30 . . . . Constructions
2038/305 . . . . . {with toroidal magnetic core}
38/32 . . . . Circuit arrangements
38/34 . . . Combined voltage and current transformers
38/36 . . . . Constructions
38/38 . . for polyphase ac
38/40 . . for dc
38/42 . Flyback transformers
2038/423 . . {with adjusting potentiometers}
2038/426 . . {with gap in transformer core}

41/00 Apparatus or processes specially adapted for manufacturing or assembling magnets, inductances or transformers; Apparatus or processes specially adapted for manufacturing materials characterised by their magnetic properties

41/005 . {Impregnating or encapsulating (insulating of windings H01F 41/12)}
41/02 . for manufacturing cores, coils, or magnets (H01F 41/14 takes precedence; for dynamo-electric machines H02K 15/00)
41/0206 . . {Manufacturing of magnetic cores by mechanical means (magnetic cores per se H01F 27/24)}
41/0213 . . . {Manufacturing of magnetic circuits made from strip(s) or ribbon(s) (magnetic cores made by winding a ribbon H01F 27/25)}
41/022 . . . . {by winding the strips or ribbons around a coil}
41/0226 . . . . {from amorphous ribbons}
41/0233 . . . {Manufacturing of magnetic circuits made from sheets (magnetic cores made from sheets H01F 27/245; soft magnetic alloys in the form of sheets H01F 1/16)}
41/024 . . . . {Manufacturing of magnetic circuits made from deformed sheets (magnetic cores made from deformed sheets H01F 27/2455)}
41/0246 . . . {Manufacturing of magnetic circuits by moulding or by pressing powder (magnetic cores made by moulding or by pressing powder H01F 27/255; soft magnetic particles H01F 1/20, H01F 1/36)}
41/0253 . . {for manufacturing permanent magnets}
41/026 . . . {protecting methods against environmental influences, e.g. oxygen, by surface treatment (magnetic particles with skin H01F 1/061, H01F 1/09, H01F 1/24, H01F 1/33 and G11B 5/706)}
41/0266 . . . {Moulding; Pressing (H01F 41/0273 takes precedence; hard magnetic particles H01F 1/06, H01F 1/11)}

41/0273 . . . {Imparting anisotropy (methods and devices for magnetising permanent magnets H01F 13/003)}
41/028 . . . . {Radial anisotropy (for rotor or stator bodies H02K 15/02)}
41/0286 . . . {Trimming}
41/0293 . . . {diffusion of rare earth elements, e.g. Tb, Dy or Ho, into permanent magnets}
41/04 . . for manufacturing coils {(coils for transformer or inductances H01F 27/28)}
41/041 . . . {Printed circuit coils (apparatus or processes for manufacturing printed circuits in general H05K 3/00)}
41/042 . . . . {by thin film techniques}
41/043 . . . . {by thick film techniques}
41/045 . . . . {Trimming}
41/046 . . . . {structurally combined with ferromagnetic material}
41/047 . . . . {structurally combined with superconductive material}
41/048 . . . {Superconductive coils}
41/06 . . . Coil winding
41/061 . . . . Winding flat conductive wires or sheets
41/063 . . . . . with insulation
41/064 . . . . Winding non-flat conductive wires, e.g. rods, cables or cords
41/066 . . . . . with insulation
41/068 . . . . . in the form of strip material
41/069 . . . . . Winding two or more wires, e.g. bifilar winding
41/07 . . . . . Twisting
41/071 . . . . Winding coils of special form (winding conductors onto closed formers or cores H01F 41/08)
2041/0711 . . . . . {Winding saddle or deflection coils}
41/073 . . . . . Winding onto elongate formers
41/074 . . . . . Winding flat coils
41/076 . . . . Forming taps or terminals while winding, e.g. by wrapping or soldering the wire onto pins, or by directly forming terminals from the wire
41/077 . . . . Deforming the cross section or shape of the winding material while winding
41/079 . . . . Measuring electrical characteristics while winding
41/08 . . . . Winding conductors onto closed formers or cores, e.g. threading conductors through toroidal cores
41/082 . . . . Devices for guiding or positioning the winding material on the former
41/084 . . . . . for forming pancake coils
41/086 . . . . . in a special configuration on the former, e.g. orthocyclic coils or open mesh coils
41/088 . . . . . using revolving flyers
41/09 . . . . Winding machines having two or more work holders or formers
41/092 . . . . . Turrets; Turntables
41/094 . . . . Tensioning or braking devices
41/096 . . . . Dispensing or feeding devices
41/098 . . . . Mandrels; Formers
41/10 . . . Connecting leads to windings (making electric connections in general H01R 43/00)
41/12 . . . Insulating of windings ({impregnating or encapsulating of transformers H01F 41/005} ; of conductors in general H01B 13/06)
41/122 . . . . {Insulating between turns or between winding layers}
41/125 . . . . {Other insulating structures; Insulating between coil and core, between different winding sections, around the coil}
41/127 . . . . {Encapsulating or impregnating (encapsulating coil and core H01F 41/005)}
41/14 . for applying magnetic films to substrates (covering metals, or materials with metals, in general C23C; manufacturing record carriers G11B 5/84)

NOTE

Group H01F 41/30 takes precedence over groups H01F 41/16 - H01F 41/24, and over group H01F 41/32

41/16 . . the magnetic material being applied in the form of particles, e.g. by serigraphy {, i.e. forming thick magnetic films and precursors therefor, e.g. magnetisable pastes, inks, glass frits (H01F 41/18 - H01F 41/24 take precedence; thick magnetic films H01F 1/0027)}
41/18 . . by cathode sputtering
41/183 . . . {Sputtering targets therefor}
41/186 . . . {for applying a magnetic garnet film (magnetic garnet materials H01F 1/346; magnetic garnet films H01F 10/24)}
41/20 . . by evaporation
41/205 . . . {by laser ablation, e.g. pulsed laser deposition [PLD]}
41/22 . . Heat treatment; Thermal decomposition; Chemical vapour deposition
41/24 . . from liquids
41/26 . . . using electric currents {, e.g. electroplating}
41/28 . . . by liquid phase epitaxy
41/30 . . for applying nanostructures, e.g. by molecular beam epitaxy [MBE]
41/301 . . . {for applying ultrathin or granular layers (ultrathin or granular layers H01F 10/007)}
41/302 . . . {for applying spin-exchange-coupled multilayers, e.g. nanostructured superlattices (spin-exchange-coupled multilayers H01F 10/32)}
41/303 . . . . {with exchange coupling adjustment of magnetic film pairs, e.g. interface modifications by reduction, oxidation}
41/304 . . . . . {using temporary decoupling, e.g. involving blocking, Néel or Curie temperature transitions by heat treatment in presence/absence of a magnetic field}
41/305 . . . . {applying the spacer or adjusting its interface, e.g. in order to enable particular effect different from exchange coupling}
41/306 . . . . . {conductive spacer}
41/307 . . . . . {insulating or semiconductive spacer}
41/308 . . . . {lift-off processes, e.g. ion milling, for trimming or patterning}
41/309 . . . . {electroless or electrodeposition processes from plating solution}
41/32 . for applying conductive, insulating or magnetic material on a magnetic film {, specially adapted for a thin magnetic film}

41/325 . . {applying a noble metal capping on a spin-exchange-coupled multilayer, e.g. spin filter deposition}

WARNING

This groups is not complete pending the completion of reclassification; see provisionally also H01F 41/32

41/34 . . in patterns, e.g. by lithography